Trains

THE MAGAZINE OF RAILROADING

MARCH 1964 • 50c

GG1

. . . 17 pages on America's most famous electric!

NEWS & EDITORIAL COMMENT

edited / DAVID P. MORGAN

ESPEE BUYS 365,000 H.P.

I AMERICAN locomotive builders (as well as Germany's Krauss-Maffei) couldn't have asked for a finer Christmas gift than Southern Pacific's year-end order for 133 diesel units valued at 34 million dollars.

Espee's order was not only big but interesting. Officially, President D. J. Russell would say only that 1964 locomotive deliveries would come from all three major domestic manufacturers and KM, that most units would produce 2500 h.p. with a few rated at 5000 h.p., and that the purchases were "in line with the steady trend toward heavier loadings and faster train speeds." Unofficially, we hear from usually reliable sources that the order includes 61 Electro-Motive 2500 h.p. B-B GP35's; 40 General Electric 2500 h.p. B-B U25B's; 6 twin-engined 5000 h.p. units (3 EMD DD35's and 3 GE U50's); 18 diesel-hydraulics (15 KM's and 3 Alco 4300 h.p. C-C's); and 8 EMD 1200 h.p. B-B SW1200 yard engines. Assuming our information is correct, several conclusions are in order.

First, Southern Pacific is not as convinced that a 2500 h.p. unit need ride on more than four traction motors. Once quite a C-C advocate (the only Western road to buy FM's 2400 h.p. Train Master, for instance), Espee now seems satisfied enough with the adhesive and tractive effort characteristics of 2500 h.p. B-B's to concentrate most of its money on them.

Second, the builder breakdown of the order warrants comment. In the past, Southern Pacific, like Pennsy, has more than sampled the products of all the builders. The current order keeps EMD in the lead but also places heavy emphasis upon newcomer (to the domestic road diesel market) GE. The 11,782-mile system confronts motive power with the Western Hemisphere's most varied operating conditions, for Espee climbs mountains from Oregon to West Texas, drills through sand storms out of El Paso and steady rain out of Portland, and moves traffic ranging from ore to TOFC.

Third, the big road has elected to follow UP's lead in examining the worth of the two-diesels-in-one concept — the DD35 and the U50. Six units will allow the road only to sample and experiment, of course, but nevertheless the interest is there. Not surprisingly, either, for if 5000 h.p. units can't hold their own in the Sierra, where can they?

Fourth, Southern Pacific is hanging tight in support of diesel-hydraulics. By the end of 1964 the road will possess a roster of 21 twin-engined C-C diesel-hydraulics. So whatever the diesel-hydraulic program has or has not proved since the original three units were imported in the fall of 1961, it has not been abandoned. Results have apparently been interesting enough to warrant Krauss-Maffei's tooling up for a strictly U. S.-style hood-unit configuration (turn to page 11 and check those trucks) as well as to justify Alco Products' investment in a domestic diesel-hydraulic. The newcomers should tell us what the Germans have learned from their American experience and what U. S. engines will do when coupled to hydraulic transmissions instead of D.C. generators.

So much for speculation. Builders and models aside, Southern Pacific's 133-unit, 34-million-dollar locomotive order serves notice that in the Far West second-generation diesels are taking over from their 1500 h.p. ancestors of 12 to 15 years ago. Thus the diesels that retired the AC's and 4-8-4's of World War II have now succumbed to technological progress and change themselves. That is the essence of the bright package the builders received from San Francisco.

In spite of jets . . .

If there is evidence anywhere in the U. S. that the de luxe passenger train can survive it is between New York and Miami. In spite of virtual round-the-clock, 2½-hour jet competition by three airlines, Coast Line and Seaboard continue to load up their 24-hour-plus *Champions* and *Silver Meteors* and to hold their own in passenger revenues. It's long-haul business (the average SAL passenger rides 534 miles vs. a national rail average of 63.6 miles) and it's consistent business (off-season hotel rates have largely wiped out the summer lull). Both ACL and SAL lose nearly 10 million dollars a year on their passenger business under the I.C.C. formula, but it's interesting to note that L&N and Southern each gross less passenger money and post higher deficits on their first-class trains.

No full assessment of the Florida trade will be possible until the Interstate highway system connects the East and Miami with limited access, divided, and no-traffic-light pavement. In the interim, though, the rails are making the most of their market. Last winter Coast Line again operated its seasonal extra-fare *Florida Special* and added full-length movies to the extras of champagne dinners, bingo games, train telephone, hostess service, and fashion shows with which it celebrated the *Special*'s diamond jubilee in 1963.

Elsewhere with passengers: Over the Christmas holidays New York Central scheduled 42 extra sections of its named train fleet. . . . Through-car Pullman service is once again available on Erie Lackawanna between Chicago and Hoboken. In 1962 Pullman service was discontinued east of Elmira, N. Y. . . . Union Pacific has joined Santa Fe in reducing

Trains

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AHEAD OF DETROIT

THE thought may not be original, but have you ever observed how much more streamlined locomotives and trains of the 1930's were than automobiles? Recently Fran Burton of our editorial staff lent me some snapshots her father made in 1936 or so as the *Hiawatha* shot past groups of people parked at the depot to see a genuine 100 mph railroad train. But the contrast between the clean-limbed 4-4-2, skirted to the knees, and the exposed running boards, headlights, and spare tires of the autos is sharp. The same thing holds for Loewy's GG1 in this issue. Could it just be that railroading influenced Detroit's stylists instead of the other way around as we've always been led to believe. Could it?

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COVER: GG1 meets Don Wood in a skilled photographer's interpretation of a famous electric.

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ARRIVALS & DEPARTURES

SCL POSTPONED: I.C.C. has postponed the January 13, 1964, effective date for implementation of Seaboard-Coast Line merger to give Florida East Coast time to file a petition for reconsideration of consolidation approval. VERY ADVANCED PLANNING: National Railway Historical Society will stage its 1967 convention in Montreal. FOR FIREMEN, WHAT FUTURE?: Federal Judge Alexander Holtzoff has refused to set aside award of Arbitration Board 282 despite union contention that legislation empowering the Board to settle fireman-off issue was unconstitutional and that Board exceeded its authority. Thus, industry planned to implement award January 25 unless unions obtained temporary restraining order from a Federal court of appeals. Meanwhile, President H. E. Gilbert of firemen's Brotherhood of Locomotive Firemen & Enginemen says he'll revive the whole case two years hence when award expires. He's also attempting once again to merge his union with the Brotherhood of Locomotive Engineers. Previously, the hoggers have given their running mates a cold shoulder. IC PLAYS SANTA: When the wells of Assumption, Ill. (population 1500) ran dry just before Christmas, Illinois Central commandeered 10,000-gallon work-train tank cars, moved 100,000 gallons of water into Assumption in three days. END OF AN ERA: Canadian National is selling its big steam locomotive shop at Stratford, Ont., to Cooper-Bessemer of Canada, Ltd. BREAKDOWN: Freight-car market revived last year as approximately 50,000 cars were ordered vs. 37,000 in 1962. Of the orders, 28 per cent were for box cars, 24 per cent for open hoppers, 17 per cent for covered hoppers, 12 per cent for tanks, 11 per cent for piggyback cars, and the balance for miscellaneous equipment. LOCOMOTIVE NOTES: Pennsy is asking for bids on up to 50 freight diesel units of 2400 minimum horsepower with delivery at "the earliest possible date." . . . Santa Fe will also buy "about 50" diesel freight units in 1964. . . . Electro-Motive, which expects domestic business to be 10 per cent better this year than in 1963, has enrolled Burlington for 18 2500 h.p. GP35's, Great Northern for 9. . . . Great Northern has also ordered nine U25B's from General Electric. FOR COMMUTERS: Budd is building 22 more bi-levels for Milwaukee Road and 6, with push-pull controls, for Burlington. WAGES UP, HOURS DOWN, STRIKE OFF: Rails averted a national strike at year's end by settling with Pullman porters for retroactive (to February 1, 1962) pay boost of 5.14 cents an hour and a reduction in monthly hours from 205 to 174 in stages from January 1 to July 31, 1964.

off-season fares as much as 22 per cent for an experimental period from January 10 to April 30, 1964. Kansas City-California round-trip coach riders, for example, can save $22.40. . . . I.C.C. Examiner Hyman J. Blond, bucking a New York P.S.C. decision, thinks Central should be allowed to drop its daily-except-Sunday RDC round trip between Syracuse and Massena, N. Y., 161 miles. . . . Rock Island and Southern Pacific want to consolidate trains 3 and 4, the *Golden State*, with Nos. 39 and 40, formerly the *Imperial* but now a head-end train, on the Chicago-Los Angeles run; but the I.C.C. has blocked the move pending investigation.

Soo's biggest waybill

At 10:45 p.m. January 8 a cab unit and two Geeps departed from Superior, Wis., with perhaps the most unusual freight train in Soo Line history. All of its 95 cars were filled with wheat — approximately 4950 tons' or 180,000 bushels' worth — billed from a single shipper in nearby Duluth to a single receiver in Buffalo. And the single waybill on which the cars moved was the biggest in revenue in Soo history: $35,007.53. The train was destined for Buffalo with no intermediate switching en route — only an interchange to the Pennsy in Chicago. Thus did Soo inaugurate the first unit train of wheat in the U. S. (previously only ore and coal have moved in unit consists), the first such train out of the Upper Midwest, and the first long-distance unit train sponsored by two railroads between rate territories.

Unit train economies will permit Soo and Pennsy (which are providing cars for the 95-car trains on a 40-60 basis) to offer miller rates approaching those of the unregulated but seasonal lake boats. For example, the shipper must load at least 4650 tons at one point within 24 hours on one waybill; the train, in turn, must go to one receiver at one location and be unloaded within 24 hours. A penalty of $475 a day applies when the equipment is not loaded or unloaded within these periods.

The I.C.C. is investigating unit wheat trains but refuses to suspend the novel operation in the interim. Soo expects to dispatch 18 to 20 unit trains of wheat out of Duluth-Superior alone before the lake navigation season opens and is also offering Twin Cities shippers the same service. Other railroads are expected to follow suit.

Perlman looks back and ahead

It's been nearly 10 years since Al Perlman left the Rio Grande in June 1954 and, at the request of the late Robert R. Young, assumed the presidency of what is today the nation's No. 3 railroad (in investment and gross, after PRR and Espee) — New York Central. Last January he took the rostrum of the New York Society of Security Analysts to give an accounting of his stewardship, to look both back and ahead. Interesting and/or significant excerpts:

¶"We were greeted [in June 1954] with the income report for the first five months, which showed the railroad to be 9 million

Number 7 of a series

Managing Editor on speeder

"NEXT THING you know, people'll be riding trains again just for fun," wrote a California reader at the bottom of a clipping he sent us not long ago. The clip, from the column of the San Francisco *Chronicle*'s Herb Caen, hinted that a noted local food consultant was working on a "whopping idea." He was negotiating for an Espee diner-kitchen unit and a switch engine which would be turned into a rolling restaurant to dally diners from Pier 45 along the Embarcadero to Hunters Point and back. Bay lights . . . a bit of wine . . . a steak . . . and wheel clicks. A joyous thought. And we hope that the Port Authority (whose approval is needed) stamps its O.K. on the project. Railroading can be delightful as well as deep — and you'll find both facets reported regularly in this magazine. Treat yourself right now to a subscription to TRAINS, *the* magazine of railroading.

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dollars in the red. Willard Place, who was our Financial Vice-President, submitted a cash estimate showing that on the first business day in January 1955 we would have 6 million dollars in the banks to meet a 35-million-dollar payroll. . . . Our debt maturities in the five years 1958 through 1962 would be 232 million dollars, practically all of which would have to be paid off in cash. Our Chairman Bob Young's reaction was revealed in his question to me, 'Are you terrified?'"

¶"Central had been principally oriented toward a passenger-carrying railroad. For 30 years, very little had been done to modernize its freight facilities. A total of 260 million dollars had been spent since the war for new passenger equipment and facilities, even though the passenger business by then had become an overpowering loss leader! There was not a track in any freight yard on the whole system that could hold even an 80-car freight train. While we had a four-track railroad between Chicago and New York, the two high-speed tracks, signaled for passenger trains, could not be used for freight trains. And the freight tracks were maintained for a maximum speed of 30 mph."

¶"The job has been tough but a challenging one. . . . Today, our yards can handle 200-car freight trains and some of our freight schedules call for speeds well over a mile a minute. In addition to investing over 420 million dollars in physical improvements since 1954, we have succeeded in paying off an enormous amount of fixed debt, resulting in a net

IRON HORSE RAMBLES

To Everyone, Everywhere whose hearts are attuned to the staccato beat of the Iron Horse. To those who have ridden behind the fiery steed, have felt his thrust, have heard the Shout of the Soul's First Divination: THIS is a CALL TO ARMS!

* * *

The following letter was sent to Mr. F. G. Fisher, Chief Mechanical Officer for The Reading Lines, a real gentleman of the High Iron, who with your help, would assist in keeping the T-1's under steam! This space paid for by Dr. C. F. Berry to assure publication of this letter.

Dear Mr. Fisher:
As the Captain is unto his Ship, so are you unto the Rolling Stock of the illustrious Reading Railroad. However, this "little old wine maker, me" is but one small stone in the vital right-of-way ballast that enables the Trains of Reading to accomplish their unfailing rounds. Mine is but one still, small voice crying from the wilderness of your millions of patrons — and boosters, yet I hope it will be heard, far beyond the Alleghenies . . .

It seems that this great railroad system of yours has done itself proud by harboring two young ladies of fiery deportment. Ladies known to the Engineering Staff as a pair of T-1's and to their admiring fans simply as Nos. "2100" and "2102."

In this age of pseudo progress, we have lost most of the grandiloquent things of the romantic past. A steam locomotive is, without doubt the acme in man's creation of beautiful machinery. Even small children treated to Reading's benevolent display of these breathing mechanical mammoths, have cowered in awe and wonder at the engine's might and main! . . . The Reading Railroad, through its generosity and an innate vision of the far, has fondly stanchioned a few remaining iron horses in their stables, and for this unforgettable devotion, literally thousands, if not millions have found a little bit of Yesterday's Drama to bring a smiling pride to their hearts.

But, my dear Mr. Fisher we cannot say "Farewell" to those intrepid beasts of yours champing at the bit out in the Reading Yards . . . Though I'm far-removed from the Schuylkill, I often recall the day in early youth when my father went to Norristown to work for the Wilcomb Machine Company — and the words: "Philadelphia & Reading" became part of my childhood philosophy — and some of your anthracite has rubbed off on *me*!

. . . My desire is only to save this great undertaking that Reading has so heroically championed. If it's capital that's needed to keep the Iron Horse Rambles going, I am ready to donate my humble share — and I know there are millionaire steam fans who could well afford to keep the fires burning on those big Wootten grates so that a brace of titantic horses could long echo Reading's banshee call over Pennsylvania hill and dale.

Cordially yours,
Dr. C. F. Berry, 385 Cilley Rd., Manchester, N. H.

Mergers . . . where are we?

ACCORDING to the Association of American Railroads, which has recently issued a sort of informal "white paper" tally sheet on the subject, "the modern merger movement can be dated roughly from 1957, when the I.C.C. voted approval of the merger of the Nashville, Chattanooga & St. Louis into the Louisville & Nashville Railroad." Of course, L&N had acquired control of NC&StL in 1880 and had run it with more or less an iron hand ever since, but then, every movement must begin somewhere. Soon thereafter Chicago & North Western successively picked up tiny (68.6 route-miles) Litchfield & Madison and leased C&NW-controlled Omaha Road. Thereafter the merger movement gained momentum:

1959: Virginian was merged into Norfolk & Western, significant because both were parallel and prosperous. But VGN was too small to forecast a trend. The same could be said for Coast Line's absorption of its long-time affiliate, Charleston & Western Carolina.

1960: Merger of Missouri-Kansas-Texas of Texas into parent Katy was little more than ironing out a onetime Lone Star corporate law absurdity, but splicing Erie and Delaware, Lackawanna & Western into Erie Lackawanna was an arresting development. Both were parallel, competitive roads — but near bankruptcy, which prompted the I.C.C.'s approval. Soo; Duluth, South Shore & Atlantic; and Wisconsin Central (Soo's Chicago entry) also got together, but this again was a formalizing of a long-standing family alliance.

1961: Merger of Texas & New Orleans into parent Southern Pacific was, again, a Texas quirk overcome.

1962: Three minor control cases and one major one cleared the I.C.C. two years ago. PRR was allowed to exercise its long-held control of barely breathing Lehigh Valley, and Ann Arbor was switched from the control of Wabash to that of Detroit, Toledo & Ironton—a sort of musical chairs game within the PRR family. *But* Chesapeake & Ohio was permitted to control Baltimore & Ohio, the most significant I.C.C. action to date since it forecast [see below] Commission approval of three systems in the East. But again, B&O was hanging on the ropes financially, and its desperate condition influenced the I.C.C.'s award. Oh, yes, Southern won control of the 1709-mile Central of Georgia, which had been fought over by the Frisco and onetime parent Illinois Central but still was, of its own right, no great shakes in the merger and/or control movement.

1963: Southern won control of bankrupt-since-1929 Georgia & Florida in another I.C.C. Act of Mercy case; and Frisco merged with its Texas subsidiary. *The* case, though, was I.C.C.'s approval (now being contested by connecting Florida East Coast) of Atlantic Coast Line and Seaboard Air Line because both roads are solvent and parallel *and* because ACL was allowed to continue its control of big L&N.

As of today, the I.C.C. is sitting on a fat backlog of control and merger cases as the railroads continue to push their case for corporate reduction. The Big Three are these:

¶Great Northern+Northern Pacific+Burlington (but not FW&D and C&S) and lease of SP&S — filed for February 17, 1961; hearings closed July 11, 1962; now awaiting examiner's report.

¶Norfolk & Western+Nickel Plate and lease of Wabash as well as purchase of Pennsy Sandusky (O.) branch — filed for January 10, 1962; hearings closed May 2, 1962; favorable examiner's report filed April 10, 1963 (notable qualification: PRR must divest itself of N&W stock); now awaiting I.C.C. approval.

¶Pennsylvania+New York Central—filed March 9, 1962; hearings closed (36,000 pages of testimony later) on October 4, 1963; awaiting examiner's report.

Elsewhere, Mopac has won an examiner's approval of its bid to control C&EI; Santa Fe has also received an examiner's nod over Espee to control Western Pacific; Santa Fe and Mopac are talking merger informally; Union Pacific and North Western are squabbling over Rock Island (with Espee to get RI south of Kansas City if UP wins); IC wants GM&O; and Mopac wants to finally merge outright with its long-controlled T&P.

If all existing cases cleared the I.C.C., the Pennsylvania New York Central Transportation Company would have more assets (4.1 billion dollars), employees (117,625), gross revenues (more than 1.4 billion), and track-miles (42,902) than anybody; but Great Northern Pacific & Burlington Lines, Inc., with 24,541 route-miles, would become America's longest railroad.

debt reduction of over 242 million dollars since January 1958."

¶"We now have 1653 miles of main line under C.T.C., more than any other railroad east of the Mississippi. . . . The entire main line from New York to Chicago operates under this advanced form of electronic control."

¶"One of the basic projects in our program is the installation throughout the Central's 10,000-mile system of an instantaneous communications network, which was begun in 1962. By the end of this year any of our 48,000 employees will be able to speak with any other employee in less than 10 seconds."

¶"The economies, the reduction in debt, and the many other improvements we have made allow us to show profits today with a volume as low as 250,000 revenue cars per month, which compares favorably with the situation in 1957, when we suffered deficits with a volume exceeding 300,000 cars a month."

¶"Consider the revolution in the hauling of automobiles. Here, again, was business lost to a higher cost mode — in this case the truck. Yet, in less than three years, Central has recaptured a steadily increasing volume of this business and is now the largest auto carrier in the world. In the year 1963, we hauled over 700,000 automobiles which were previously being carried by truck or water. . . . We have created two new trains to haul these cars. And I don't think you have to be a railroader to experience a thrill in seeing a train two miles long, powered by seven diesel units, highballing down the main line with 1800 gleaming new automobiles. It's enough to make a poet out of an operating man."

¶"Everybody talks about the future of containerization, yet not everyone realizes that Central operates the largest all-container business in the world. In 1963, our Flexi-Van business totaled just under 100,000 vans — 7 per cent of the nation's piggyback volume and over 5 per cent of Central's entire freight revenue. And this from an operation which turned its first wheel in April of 1958!"

¶"Our merger [with PRR] will help solve what has become known as the Eastern Railroad Problem. No merger is a panacea, but this merger will give breathing time to beleaguered Eastern railroads until, hopefully, our Federal government finally evolves a rational transportation policy. . . . The approval by the Commission and the courts of the C&O's control of the B&O foreshadows approval of our case. The commission there sanctioned the structuring of the first of the three balanced, competitive systems shaping up in the East. Commissioner Tucker, in his dissent, characterized the C&O-B&O case as a 'first step toward approval of a far reaching realignment of the Eastern railroad system.'"

¶"Our new marketing and sales techniques are bringing back business which had been lost to competing carriers. Compared with the last decade, our future looks bright indeed, and we look forward to the coming space-age transportation with excitement and optimism."

ROBERT SPARK

DIESELS FOR U.S.A.: The first of the "second generation" diesel-hydraulics for Southern Pacific [pages 3 and 11] emerged on schedule from Krauss-Maffei's Munich-Allach plant in the fall of 1963. Trial runs were made over German Federal tracks before final painting and preparation for shipment to the U.S.A. All 15 of these 4000 h.p. units are due to be delivered in the spring. Many features are similar to those on the first German-built diesel-hydraulics supplied to the Espee and the Denver & Rio Grande Western, but the external appearance is considerably different since the new locomotives are hood units. Each one is equipped with two Maybach MD870 16-cylinder engines which are pressure charged and intercooled. Each engine develops 2000 h.p. at 1600 r.p.m. The Voith turbo transmissions are also similar to those on the previous units — type L830rU with three torque converters, built-in reversing gear, and hydrodynamic brake. From each transmission power is taken to an intermediate KM gear and then to a Maybach C34 final drive.

The design is slightly longer than the earlier cab units — approximately 67′ 7 5/16″ over couplers. Maximum height is 15.8 ft. and maximum width is 10.9 ft. Each hood unit has an empty weight of 153.2 tons and a service weight of 178.6 tons. Axle-load is 29.8 tons. The maximum speed is 70 mph. Brown Boveri electrical control equipment is fitted, and the locomotives can of course operate in multiple unit and also in multiple unit with diesel-electrics. Braking equipment is identical to that of the cab units: U. S. Westinghouse 26 L type with German Westinghouse 413 P4 compressors. Two Vapor Watchman units are fitted.

A CHANGING ROLE: One of Britain's most famous locomotive works has now changed over entirely to the building of electric locomotives and the repair of diesels. It is the workshops at Doncaster, opened by the former Great Northern Railway in 1853 and known locally as "The Plant." From 1867 to 1957 over 2200 steam locomotives were built there, ranging from Patrick Stirling's 8 ft. single drivers to Sir Nigel Gresley's streamlined A4 Pacifics. The Plant's last "steam" task has been to restore the record-breaking streamlined Pacific *Mallard* to its original condition. Withdrawn from service in April 1963, *Mallard* is shortly due to enter the Museum of British Transport, where it will be the largest locomotive exhibit. Future steam locomotive repairs will be carried out at Darlington — a significantly logical move in view of that town's association with the world's first public railway. Another old established center for the construction and repair of steam locomotives — the

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works at Derby — has also switched over solely to the building and repair of diesels. Derby works was established in 1840, and the last steam locomotive was built there in 1957.

At another of BR's works, this one Swindon, a new diesel testing station is being built. It will enable all kinds of high-speed engines and transmissions for diesel-hydraulic locomotives, diesel-electric shunting locomotives, railcar engines, and diesel Pullmans to be run in and fully tested under controlled-load conditions before being put into service.

EXIT THE A 3/5: Yet another class of the Swiss Federal's rapidly diminishing fleet of steam power has recently been withdrawn. It is No. 705, the last example of the A 3/5 class of 4-6-0's. The fleet-footed A 3/5 class Ten-Wheelers were introduced just after the turn of the century and eventually 111 were built. No. 705 will not be scrapped, and eventually it will be handed over to the Transport Museum at Lucerne.

BR SHIPS: Discussions, proposals, and plans for a cross-Channel tunnel or bridge linking Britain and France drag on. In the meantime the Southern Region of British Railways is faced with the problem of whether or not to increase and modernize its fleet of cross-Channel ships. On the Eastern Region, which operates the overnight service between Harwich and the Hook of Holland, the problem is not so acute. Come tunnel or bridge, this route is likely to maintain its popularity. Anyway, the Region has enough faith in this philosophy to have recently placed in service a luxurious new 5.3-million-dollar ship, the S.S. *Avalon.*

Biggest in the BR fleet (nearly 7000 tons), the *Avalon* is equipped with all the latest types of equipment to aid docking and navigation. Its interior, designed by consultants Ward & Austin and carried out by one of London's top decorating firms, Trollope's, is considerably ahead in style and finish of the trains that convey passengers from London and Harwich. It also makes passenger facilities at Harwich look Victorian in comparison.

Freight traffic via the Harwich-Zeebrugge trainferry which has been steadily increasing is also likely to hold its own come Channel tunnel or bridge. A new ferry is on order to help handle the capacity traffic.

One side of BR's extensive shipping business which is expanding on all sides is that of automobile ferries. A new one is about to be ordered for service between England and Ireland while two other ships on the Irish route are to be refurbished.

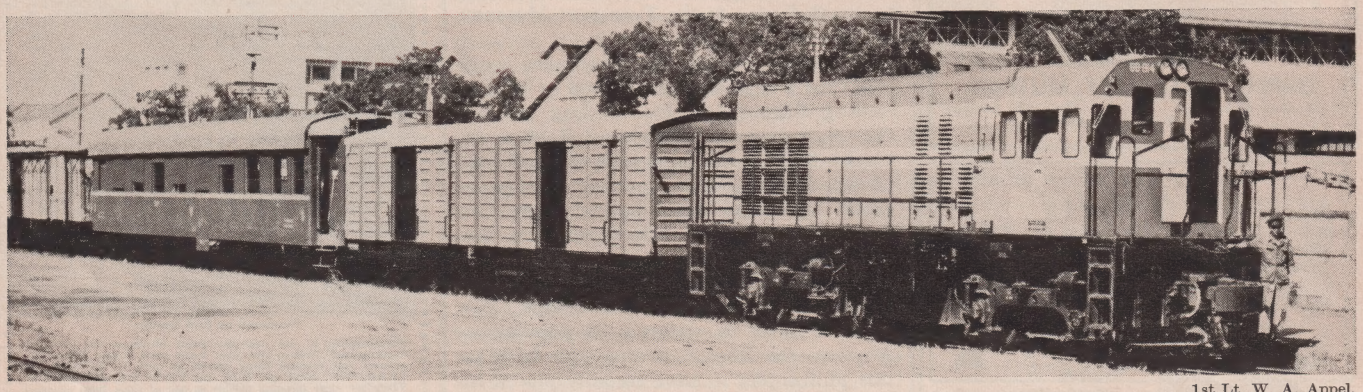
SWISS PROBLEMS: Disaster struck the first of the Swiss Federal's new 5600 h.p. 87-ton electric B-B locomotives when it left the track at about 60 mph while on trials (see "Powerful Lightweights," page 9, February 1964 TRAINS). It is reported that the cause of the accident was not due to the locomotive but to a signaling fault. If this is the case it merely serves to highlight some of the problems which are facing the Swiss system. These include the fully extended use of motive power, a shortage of skilled staff, and capacity traffic on a number of key routes. To help out with the motive power problem, the

Continued on page 14

CREEPER comes a cropper: Last run of the mixed train on North Carolina end of N&W's Abingdon Branch slowed down for Nella, N. C., last November 16. Virginia service was dropped over a year before, but line continued to offer passenger service on North Carolina segment between Nella and West Jefferson until state authorities O.K.'d discontinuance of passenger accommodations. Freight service continues.

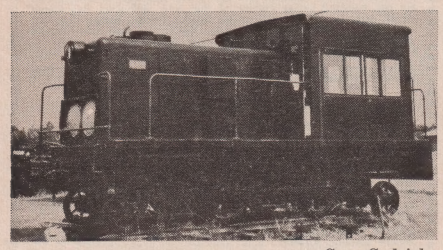
RAILROAD NEWS PHOTOS

Michael J. Dunn III.



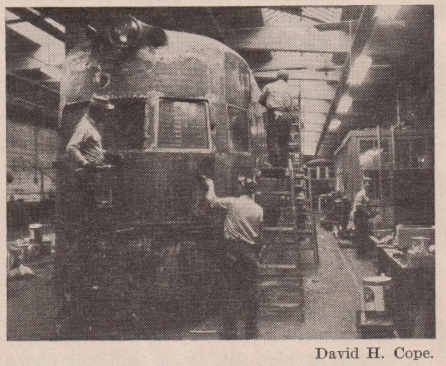
1st Lt. W. A. Appel.

SAIGON YARD was switched by recently arrived General Electric U8B unit of Vietnamese National Railways last November.



Gary Gadziala.

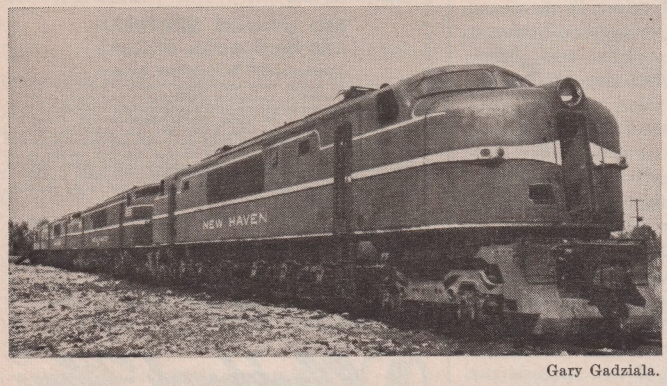
GAS-TURBINE switcher, 150 h.p. Boeing-equipped Davenport unit built for U. S. Army in September 1954, spends its days on used equipment lot in Charlotte, N. C.



David H. Cope.

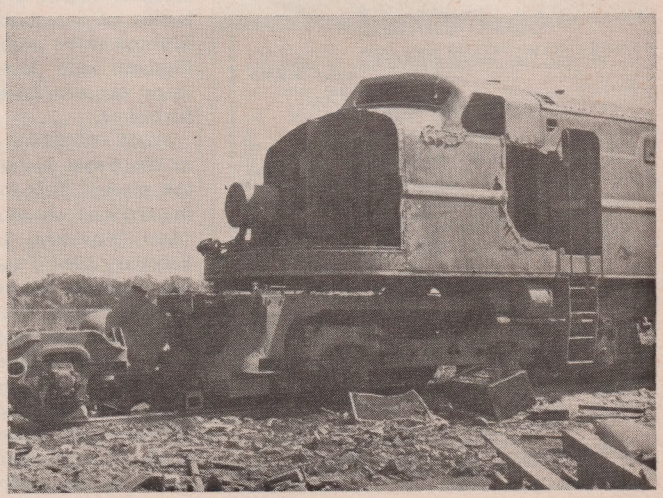
PAINT REMOVER and scrapers were applied to a former North Shore *Electroliner* as it was readied for commencement of service on Philadelphia & Western January 31.

METER-GAUGE diesel-hydraulic switchers (15 of 'em) built by Kisha Seizo Kaisha of Japan are being delivered to Malayan State Railways [page 20, February TRAINS]. The 0-6-0's weigh 36 tons and have counterweights and side rods. Maximum speed: 35 mph; starting tractive effort: 24,200 lbs.

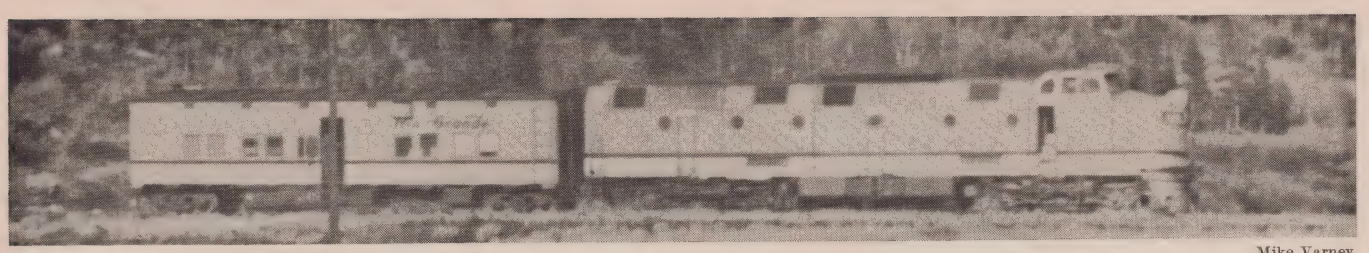


Gary Gadziala.

ARRIVAL of Virginian electrics on New Haven brought joy to juice fans, but sad result was scrapping of older NH power which had been stored in Oak Point yard. All 10 of 150-class EF-3's built by Baldwin-Westinghouse and GE in 1942-43 are going.



Peter C. McLachlan.



Mike Varney.

DURING helper service, Rio Grande's 1961 KM diesel-hydraulic 4002 and dynamometer car wye at East Portal, Colo., in August 1963.

Album of KM's

FIFTEEN 4000 h.p. diesel-hydraulics with a new American look — the hood profile — are being delivered from Germany's Krauss-Maffei to Southern Pacific [pages 3 and 8].

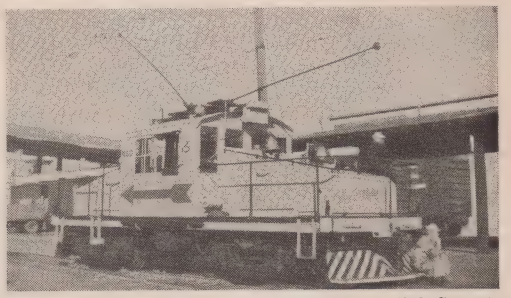
Donald E. Smith.

COUPLED with EMD B unit and ever-present dynamometer car, Espee 1961 KM diesel-hydraulic 9001 heads a southbound extra at Stockton, Calif., on October 16, 1963.

James C. Smith Jr.

ONE of 30 coaches bought last year from PS by Port of New York Authority and leased to LIRR was displayed at Jamaica, N. Y., last August.

Jim Wozniczka.



Bob Gevaert.

IN DAILY operation in Vancouver is British Columbia Hydro & Power Authority (ex-B.C. Electric) steeple-cab electric (former Oregon Electric).

HEADING for Whiting, Ind., with interchange for B&O last November 10 was Chicago Short Line Railroad's ex-DM&IR EMD switcher No. 24.

William A. Burke.

PUZZLED concerning the whereabouts of Reading's *Crusader* equipment? It was sold to Canadian National and was snapped recently in Manville (N. J.) yards ready for shipment to Canada.

R. J. Sandusky.

HEAVY winter grain hauling recently prompted Canadian National to lease 20 B&LE 1500 h.p. A and B units for use out of Mimico Yard (Toronto) on runs to Sarnia and Fort Erie, Ont.

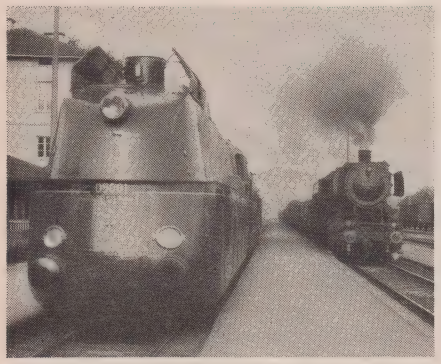
C. W. Hauck.

RIO GRANDE 2-8-0 No. 346 (right) welcomed Burlington 4-8-4 No. 5629 to Colorado Railroad Museum at Golden, Colo., last August 30. CB&Q presented the O-5 to the Intermountain Chapter of the National Railway Historical Society for display at museum.

STEAM! RAILROAD NEWS PHOTOS

William J. Husa Jr.

AS the sun drops in the late afternoon of November 27, 1963, Bevier & Southern 1920 Baldwin 2-6-0 No. 112 glistens in a place of honor in front of the Bevier (Mo.) post office. Leased Burlington switchers displaced the regular steam operations of the B&S.



Cord-Christian Troebst.

WARM-UP at Munich, West Germany, last May 30 prepared German Federal's famous 05001 for her last run which ended on grounds of traffic museum in Nuremberg. Twenty-eight years ago 05001 steamed up to 120.25 mph on regular Hamburg-Berlin run.

Jim Bower.

COMPLETE and nearly serviceable, N&W No. 475 was stored at Roanoke, Va., in May 1963 by owner Virginia Iron & Metal Company which has had the 4-8-0 for several years. Also stored but unserviceable (fate undecided): 4-8-0's 1118, 1134, 1151; 2-8-0 917.

William J. Husa Jr.

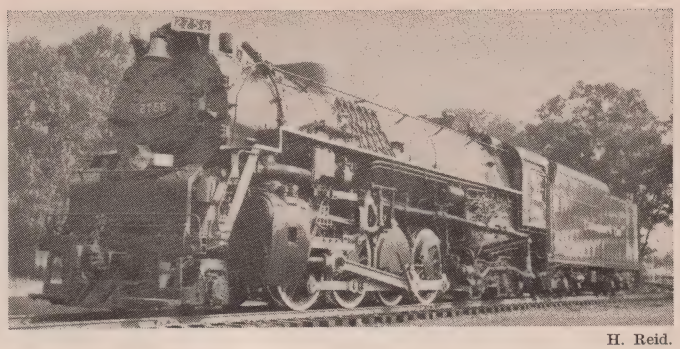
SILVER-HELMETED switchman holds down the footboard as Heisler No. 2 steams across a street while switching private trackage at Memphis, Tenn., for Forest Products Chemical Co. The Heisler does the work for a sprawling wood distillation and coking plant.

Henry C. Peraza.

WORKING side by side with one of the newer diesel units in Colombia — 1320 h.p. GE Universal unit acquired in 1961 — is 1945 Baldwin-built 4-8-2 No. 125. The two American imports are on the roster of the 3-foot-gauge Colombian National Railways.

Mike Varney.

MILLION-MILER Big Boy No. 4004 now rests on a concrete platform in Holliday Park in Cheyenne, Wyo. Location at the foot of Sherman Hill — scene of many a battle between iron horses and nature — is a suitable one for Union Pacific's 1941 Alco 4-8-8-4.

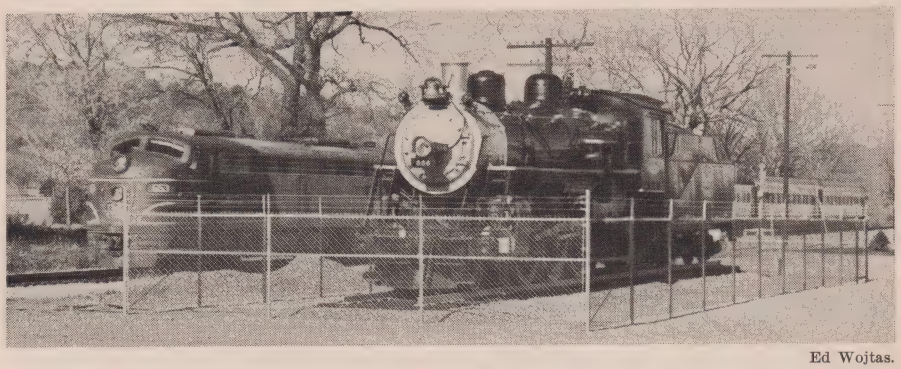


H. Reid.

LATEST Chesapeake & Ohio locomotive donation — 17-year-old Lima-Hamilton 2-8-4 No. 2756 — went to Newport News, Va., and is now on permanent display with all rods attached. The 2756 formerly ran past its new home in Huntington Park.

John Gruber.

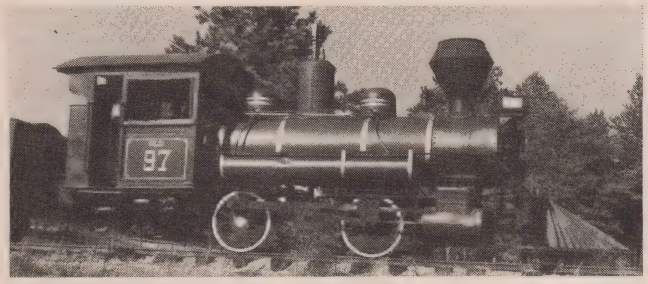
POPPING through giant paper birthday card covering door of her birthplace, West Burlington (Ill.) shops, Burlington's 4-8-4 No. 5632 celebrated her 23rd anniversary during excursion out of Chicago sponsored by Illini Railroad Club September 29, 1963.



Ed Wojtas.

OLD 886, Rock Island 4-6-2 recently refurbished after being damaged by vandals [page 10, December 1963 TRAINS] can be seen from passing trains and a paralleling highway in her new location at the Detweiler golf course at Peoria, Ill.

With the tourist pikes



Gary Gadziala.

STILL ANOTHER tourist pike is planning to commence operations this spring. "Old 97" belongs to Frey's Lake Railroad, Concord, N. C. The Alco-Cooke 0-4-0T was built for Armour Leather in June 1916, came to Concord from Meade Corp., Silver, N. C.

Bill Dudley.

MAJOR OVERHAUL was nearly finished when this photograph was taken last June 14 of ex-Oregon Lumber Company narrow-gauge Shay No. 7 being readied for duty on Black Hills Central's "1880 train ride" from Hill City to Oblivion, S. Dak.

William J. Husa Jr.

MAY 30 will be opening day for the 1964 season at Mid-Continent Railroad Museum, North Freedom, Wis. Ex-Dardanelle & Russellville 2-6-0 No. 9 [page 19] is expected to join former C&NW 4-6-0 No. 1385 hauling passengers on 9-mile round trip.

William J. Husa Jr.

"OLD CINDERS" served the Highlander Railroad which began operation last summer with a 5-mile round trip at Maggie Valley, N. C. The two-truck standard-gauge Heisler was No. 2 of the Santee River Hardwood Company at St. Stephens, S. C.

Swiss system hired a number of B-B electrics from the German Federal in 1963. There is no such solution for the staff problem, although workers for unskilled jobs have been recruited from other countries. Capacity traffic — particularly over the Gotthard line — has placed a considerable strain on the network, especially during the summer with its heavy passenger vacation traffic. New facilities are scheduled but some of these will take time to complete. For example, a new classification yard at Basel will ease freight movement at this key point adjoining France and Germany, but it will not be operational for another five or six years. In the meantime, existing yards work round the clock to keep cars rolling.

OVERNIGHT LUXURY: Having recently introduced a second-class overnight low-cost fare between London and Scotland (the "Nightrider" ticket costing $5.60 one way), British Railways is now after the first-class traffic. It has inaugurated a luxury first-class sleeping-car service between London and Glasgow which supplements the existing sleeping-car trains between England and Scotland. Catering to the passenger with the deeper pocket, the new train is the *Night Limited* linking London and Glasgow. Each northbound and southbound train has 110 single-berth sleeping compartments of the latest type. For those wanting late night refreshments there is a Pullman "Nightcap Bar" with an adjoining lounge. The bar opens before the train departs and closes at 1 a.m. when the *Night Limited* is well on its way. One-way fare on this express, including sleeping berth supplement, is $23.25

DIESEL PROGRESS: By 1966 the Belgian National Railways expects to have enough diesel locomotives in service to meet nearly all its traffic requirements. Currently there are 229 high-powered diesels in service, 135 of them built within the last two years. Medium power units total 56 with another 96 to be delivered this year and 105 in 1965. The majority of the high-powered diesels have GM engines and electrical equipment and have been built by GM's Belgian licensees. Diesel switchers now number 240 and a further 70 will be added by the end of 1965. Sixty low-powered diesels of 240 h.p. are being progressively introduced and are suitable for light switching and branch-line duties.

The electrified network — at 3000 v. D.C. — is also being extended. The most recent advance has been the completion of the route between Brussels and the French frontier, while work is now starting on the heavily graded line between Liege and the German frontier.

MUSEUM LINE: Anyone traveling over the "Bird's Flight Line" linking Denmark and Germany may notice, when passing through the Danish town of Nykobing F1., locomotives or railcars of the LJ or Lollandsbanen. A standard-gauge private system, the LJ operates both buses and trains (all diesel-powered), and the latter serve the quiet little town of Maribo in the center of the island of Lolland. Here, on any summer week end, the Danish Railway Club runs its vintage train service over the 5 miles of track to Bandholm. During weekdays the branch sees the occasional freight, but on week ends the motive power and rolling stock are strictly of another age. At present the operational motive power consists of 1878 0-6-0 tank locomotive *Faxe* built by Krauss and an 0-6-0 built in 1901. These two steam locomotives are supplemented by a four-wheel gasoline-engined railcar built in Denmark in 1926. Passenger cars come from various Danish systems (some now defunct), and the earliest example dates back to 1879 while the latest was built in 1911. There are also four freight vehicles including Carlsberg and Tuborg brewery box cars of 1890 and 1895 respectively.

Some additional motive power and rolling stock have not yet been restored.

WILLIAM K. VIEKMAN

COMING THIS YEAR: In a recent survey among railroads operating "beyond the Pacific" it was learned that the following improvements and acquisitions are included for 1964: *Australia:* The New South Wales Government Railways people are expecting to maintain the present rate of dieselization and hope to retire all steam within the next five years. Diesels and electrics are presently being delivered at the rate of 40 units per year. . . . Thirty-six diesel-electrics are to be outshopped for the South Australian Government Railways. Seven hundred thousand dollars will be spent by the Victorian Government Railways for electrification. . . . On Tasmania the railway will take delivery of one diesel-hydraulic switcher and two mainline growlers. *Cambodia:* Six 1000 h.p. diesel-electrics are to be added to the roster of the Royal Cambodian Railways plus four diesel-hydraulics. *Japan:* Latest figures show that the Japanese National Railways' stable is composed of 3601 steam locomotives, 957 electrics, and 335 diesels. . . . 1964 will see the opening of the new standard-gauge "Bullet Line" and a simultaneous Asian Railway Conference in Tokyo. . . . The privately owned Kei-Han-Shin Express Railway will purchase 27 new interurban cars. *New Zealand:* $210,000 will be spent on electrification. . . . New head-end equipment (usually seen at the rear of New Zealand trains) to be ordered will include one or more postal cars. . . . The railway's budget includes the further improvement of stations. Item: When Wellington Terminal was opened in 1937 about 140 passenger trains arrived and departed during a normal working day. That figure had jumped to 391 by 1962. *Philippines:* Work will continue on the 202-mile Cagayan Valley Extension which will open the northern Philippines to railway commerce by 1966. At the other end of the system the 87-mile Sorsogon Extension will connect Manila with Matnog (southernmost city on Luzon) by rail, will include a carferry service to the city of Allen on Samar and thus

make the Manila Railroad an inter-island system for the first time — *this year. India:* While still importing diesel-electrics, Mother India is now building them at home as well. However, new steam locomotives continue to be outshopped at Tatanagar and Chittaranjan. *Thailand:* The Thai State Railways expects 40 diesel-electrics and 27 diesel-hydraulics this year. Also to be acquired are 65 passenger cars, 7 diesel railcar sets, and some 1654 freight cars. *Taiwan:* We've saved the best for the last. While it is true that the Taiwan Railway Administration plans to purchase some diesel-electric locomotives, it has also committed itself to acquire mainline *steam* engines. Although the exact number of new locomotives has not yet been released, the basic fact of steam's usefulness in 1964 is refreshing indeed. Just one vital question remains: Who will the lucky builder be?

SHORT LINES

WILLIAM S. YOUNG

THE BOWDON BOWS OUT: Bowdon Railway, an agricultural short line in the hills of north Georgia, has passed out of existence. The 12-mile road, which made its final run last summer, reported that it was over $27,000 in debt and its locomotive had been condemned. Linking the town of Bowdon with the Central of Georgia, the line was opened in 1911 under the aegis of Bowdon businessman J. L. Lovvorn, whose widow later served as its president. In 1944 Bowdon banker and merchant W. C. Roop became receiver of the by-then-ailing railroad, which he bought and reorganized a year later as Bowdon Railroad & Transportation Company — a corporate title that lasted only until 1953, when Roop went back to the old name of Bowdon Railway. During the '40's the Bowdon operated with a motorcar made from an International truck, and a 4-4-0, No. 351, borrowed from the Central of Georgia. (The 351 also saw service on another Georgia short line, the now defunct Talbotton Railroad.) At the end, No. 5693, a 3-axle Plymouth diesel-mechanical locomotive, was the only motive power. In its day the road hauled feed, fertilizer, cottonseed oil, lumber, pulpwood, and supplies over 60-pound rail and 1 mile of 2 per cent grade. It had lost money steadily since 1958. Truck competition, said President Roop, was just too much for the Bowdon.

FRISCO GETS NORTHEAST OKLAHOMA: The Frisco has obtained I.C.C. permission to acquire control of Northeast Oklahoma Railroad. A 46-mile Kansas-Oklahoma zinc road, the NEO was formerly owned by Eagle-Picher Company. Begun in 1908 as Oklahoma, Kansas & Missouri Interurban Railway, it was actually steam operated until 1921, then electrically operated until diesels took over in 1940.

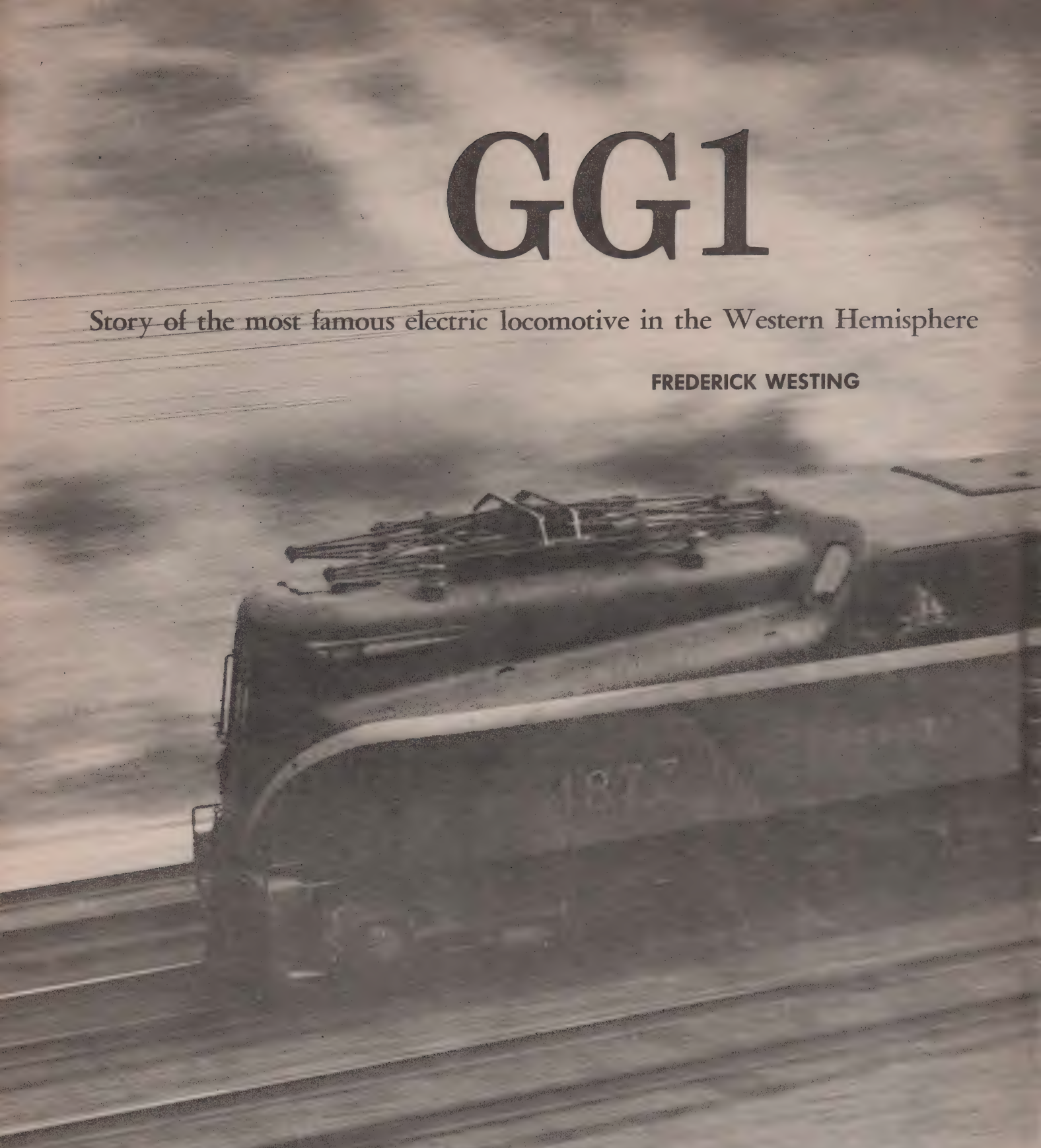
OLDSTER: The 5-mile Dardanelle & Russellville Railroad of Arkansas has sold its 2-6-0 No. 9, an 80-year-old Baldwin, to the Mid-Continent Railway Museum at North Freedom, Wis. Mid-Continent's acquisition was built as New Orleans & North Eastern No. 232 in 1884 and was updated at NO&NE's Meridian (Miss.) shops a mere 60 years ago, in 1904. The Mogul had been on the D&R since 1917 and last received major repairs in 1959.

BETE NOIRE AT POINTE NOIRE: Railroading in Canada's Quebec North Shore district, on such ore haulers as Quebec North Shore & Labrador and the Cartier Railway, is notably modern. But one of the oldest and smallest North Shore railroads, Gulf Pulp & Paper Company's line from Clarke City to Pointe Noire, was still using Nos. 28 and 48, a pair of Davenport 0-6-0's with long, pointed pilots and Radley & Hunter stacks. Until recently, that is, when Gulf got a 70-ton diesel from the QNS&L. The diesel arrived via the newly completed terminal branch of Wabush Iron Company's Arnaud Railway, which extends from a junction with QNS&L to tidewater at Pointe Noire. Iron Ore Company of Canada, QNS&L's owner, was reportedly to get one of the 0-6-0's for display. T

GG1

Story of the most famous electric locomotive in the Western Hemisphere

FREDERICK WESTING



A PENNSY POWER PROFILE—1

IF EVER the expression "perennial youth" was applicable to locomotives, the Pennsylvania Railroad's GG1-class electrics deserve it. They were doing a marvelous job in the '30's; they performed tremendous work in the wartime '40's and again in the postwar '50's; and now in the '60's they are still holding the line.

Yes, time has touched them lightly and the feeling of youth is still within them. Externally the only difference between the GG1's of today and those of years ago is the larger-size lettering and the use of a big Pennsy keystone insignia together with the deft dab of chrome yellow paint

William D. Middleton.

that replaced the "cat's whiskers" gold-leaf striping. But that was just a face-lifting job; the original rugged dependability and peak power performance of the GG1's is unchanged.

Singly, the GG1's take on trains that would require multi-unit diesels to haul. At Washington, D.C., a GG1 sometimes couples onto a 22-car train that may represent two or three separate passenger trains up from the Deep South. Probably six or more diesel units were used to get these trains to Washington. Not infrequently one of the trains or perhaps all three arrive late. Yet by the time the combined train reaches North Philadelphia, most of the time has been regained and an on-time arrival is made at New York. This is routine for a GG1, as anyone familiar with their activities in the New York-Washington service knows.

As a passenger on a train of 17 cars headed by a GG1, I have been pulled out of Washington alongside another road's train of 10 cars headed by two diesel units. At first, in the very lowest speed range, the diesel-hauled train moved slowly ahead, but when the Pennsy engineer began to "pour it on" from that practically limitless power supply in the trolley wire, those kilowatts livened up the traction motors in a way that the diesels' fixed and strictly limited power couldn't match. Effortlessly our 17-car train forged ahead of the 10-car train with the two diesels and left it farther behind with each passing moment. Here was a practical example of what the electric locomotive's overload capacity and ability to temporarily provide excess power means in getting a heavy train quickly up to speed.

Rated at 4620 continuous h.p., a GG1 can reach and maintain 9000 h.p. at the drawbar or "payload point" on a short-time rating. In fact, at the suggestion of Westinghouse, a GG1 was once tested to the limit to find what drawbar horsepower could be developed — with Westinghouse promising to make good any damage. The GG1 slightly exceeded 10,000 drawbar horsepower. Just think of it — getting 10,000 "pulling" horsepower from a locomotive less than 80 feet in length! Of course, no single-

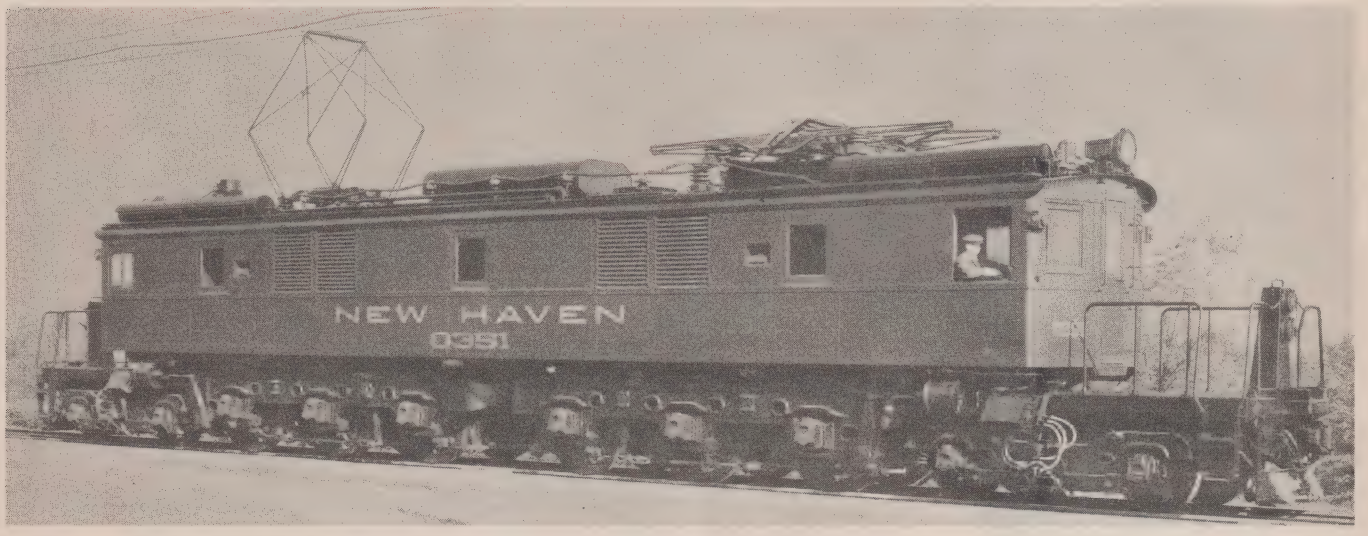
Collection of H. L. Broadbelt.

TRACKING quality limitations of P5-class electrics led Pennsylvania Railroad to re-evaluate the "4-6-4" wheel arrangement.

Collection of Frederick Westing.

R1 4800, later renumbered, hit an authentic 120 mph on test but was not successful enough otherwise to warrant duplication.

GG1 — predecessor, archetype, rival



NEW HAVEN lent EP-3a 0354 — near twin of EP-3b shown here — and its hands-down success in road trials dictated choice of identical 2-C+C-2 wheel arrangement for GG1. Cleveland Union Terminal was another successful user of the 2-C+C-2 layout.

unit diesel built to date can produce that drawbar horsepower — neither can the largest locomotives of Union Pacific's gas turbine-electric fleet. On a power-to-weight basis the GG1 has any self-contained locomotive that must lug around its power plant on its back stopped cold.

Having thousands of kilowatts at its immediate command from an overhead trolley wire gives the Pennsylvania a transportation tool and motive power unit second to none in moving trains speedily over a railroad. A GG1 only has to turn electrical energy — supplied from an outside source under conditions most conducive to its efficient production — into mechanical energy at the traction motors through suitable control equipment. The diesel, on the other hand, must first turn mechanical energy into electrical at the generator, then turn it back to mechanical at the traction motors through control equipment. This more complex arrangement necessitates what is known as a "transmission loss" which can vary, depending upon conditions, from 20 to 25 per cent. Thus the rated horsepower as listed by the diesel locomotive builders does not refer to the rail or drawbar horsepower. A diesel locomotive rated at 2000 h.p. delivers that much horsepower to the generator, but after deduction of a 20 per cent transmission loss only 1600 h.p. is left to haul the train.

When it comes to hill climbing, the super-abundant supply of current at its command gives the GG1 a decided edge over its competitors, for the engineer just notches up the controller handle a bit more and a good pace is maintained — thereby keeping the train running at a high average uphill speed. The GG1's power output is limited only by the ability of its traction motors to safely withstand the temperature rise caused by their absorption of more current and by the slipping which results when power is applied with insufficient weight on driving wheels. I well recall how the 6-mile climb of westbound trains on the New York Division between Colonia and Metuchen, N. J., used to tell on the old K4's when the train was over 11 cars. With such a load, speed dropped noticeably by the time Menlo Park was passed, and as we would swing into the long curve approaching Metuchen, a look out a right-side window would show the locomotive smoking heavily, with the fireman and engine both working hard at that point. Speed was generally slowed to a figure that allowed one to easily see the comparatively slow, rhythmic motion of the main and side rods.

When the P5a-class electric locomotives with their 4-6-4 (or 2-C-2) type wheel arrangement began in regular service over the New York Division, I noted how they kept up a steady 70 to 75 mph pace on this same uphill climb regardless of trainload. That sold me, for even to duplicate the running feats of a K4 would have been good, but to surpass them so decisively on the toughest part of the westbound run earned my admiration. I knew what that 6-mile section did to a top-notch steam locomotive, and the seemingly easy way in which the electrics covered it — sometimes with 15-car trains — was a point that couldn't be ignored.

Those pioneer P5a's were good, but then the GG1's came along — superbly topping them everywhere on the same run. But these fine GG1's did not appear overnight; they resulted from an intensive search for an electric locomotive that would best fit into the Pennsylvania's electrified passenger train operation. Yet so successful did the P5a's appear that many wondered why, with most Pennsy passenger trains within the capacity of a P5a, the Pennsylvania went to the larger and costlier GG1. Especially when two P5a's coupled in multiple and operated by one crew had power to spare for the heaviest passenger trains — power greater than that in a single GG1. Yet sound reasoning prompted the use of the GG1's.

ELECTRIFICATION on the Pennsylvania dates back to 1895 when a short line under Pennsy control was electrified between Mount Holly and Burlington, N. J. It belonged more to the local transit line species, however, than to mainline electrification. Nevertheless, it was Pennsy electrified track, and electric traction motors propelled the equipment. The year 1905 saw extensive electrification of the Pennsy's newly acquired subsidiary line, the Long Island Rail Road. Another Pennsy line, the West Jersey & Seashore Railroad, was electrified in 1906 over 70 route-miles between Camden and Atlantic City, N. J. Down on the Cumberland Valley, another subsidiary of the Pennsylvania, an application of electrified train operation was also made in 1906. Later, in 1910, the electrified line that connected New York's Penn Station with New Jersey and points on Long Island was opened. Here both multiple-unit trains and mainliners were hauled by the matchless DD1 electric locomotives. All these early installations used direct current collected by shoes and trolleys from contact lines charged with 650 volts D.C.

Around 1910 attention centered on the heavy passenger traffic congestion problem at Broad Street Station, Philadelphia, to which the suburban lines contributed much. As a starter, electrification of one of the most heavily used suburban lines was thought to be an answer. This solution was of particular significance since it was the Pennsylvania's first use of alternating current for train propulsion. Electrified train service was first furnished by M.U. equipment on the Main Line between Broad Street and Paoli, Pa., on September 12, 1915.

Single-phase A.C., at 11,000 volts and 25 cycles, was collected from the catenary-supported trolley wires by pantographs atop the cars. It was on this line that Pennsy's first A.C. locomotive — No. 3931, class FF1, built in 1917 — went to work. The 2-6+6-2 or 1-C+C-1 type had an articulated frame arrangement between two Mogul (2-6-0) type driving units. It possessed regenerative braking and operated in the uphill freight service between Overbrook and Paoli, but it was never duplicated.

The successful operation of the Paoli line confirmed the faith that the Pennsylvania had in A.C. for electrification, and all further extensions of PRR electrified track were based on its use in the trolley wire at this same voltage, phase, and frequency. Later other suburban lines around Philadelphia were A.C. operated to Chestnut Hill and Whitemarsh, on the main line to Wilmington, and on the branch lines to West Chester and Norristown.

The next A.C. locomotive appeared in 1924, with a 2-8-2 or 1-D-1 type wheel arrangement. It was designated class L5 and numbered 3930, and like the FF1, it worked in freight service between Overbrook and Paoli. Later more units of this class using D.C. worked the trains in the New York tunnel and terminal area.

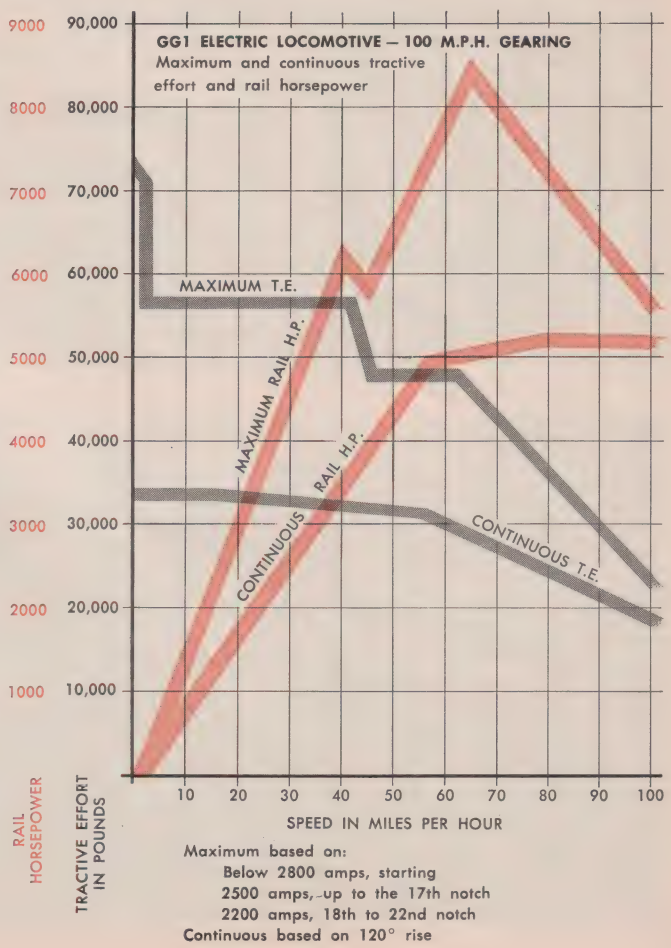
For yard switching in electrified territory the Pennsylvania used 0-6-0 box-cab locomotives. They were built to operate singly or in multiple as twin units. This type also came out in 1924, as class B2, and many went to the Long Island Rail Road where they ran on D.C. collected by shoes from a third rail. On the Pennsy, these class B1 and B3 switchers ran on trolley-fed A.C. Basically their design followed that of locomotives built years before by Westinghouse and Baldwin for the Grand Trunk tunnel that connected Port Huron, Mich., with Sarnia, Ont.

The GG1's predecessor in passenger service on the Pennsylvania's electrified lines was the class P5a. Their origin stemmed from a sledge-hammer breakthrough in the railroad electrification barrier in 1927 when Westinghouse came up with an A.C. traction motor which had exceptionally high power yet was small enough to fit within the main frames of a locomotive. The blueprint called for two such motors in a twin pattern with their armatures driving pinions that meshed with a large gear mounted on a tubular hollow shaft or quill surrounding a driving axle. This arrangement was similar to that of the drive used by Westinghouse on the New Haven electrics years before, but in this 1927 application two such motors could produce over 1000 h.p. from a driving axle, a figure hitherto impractical with this form of A.C. motor. This meant that high power rating could be obtained from fewer driving axles, thereby following steam locomotive practice in electric locomotive construction — a custom to which Pennsy clung tenaciously. Pennsy could, and did, however, forgo its usual side-rod drive.

This powerful A.C. traction motor tied in with the Pennsylvania's leaning toward steam locomotives in the building of its electrics, for it meant high power concentration from a locomotive of moderate size with few driving axles. And it fitted right in with the Pennsy's preference for single-phase A.C. electrification.

The impact of this traction motor was of such significance that in 1928 the Pennsylvania announced its intention to electrify 325 route-miles and about 1300 track-miles. These mileages were greatly enlarged in time.

The first Pennsy electric passenger locomotives built



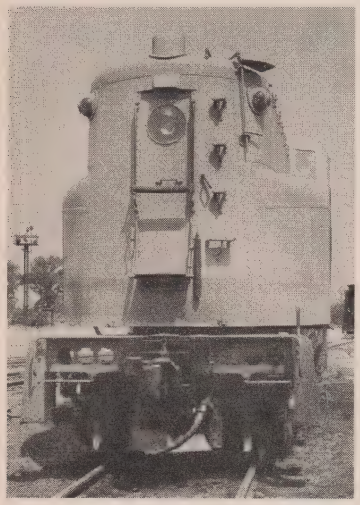
around this powerful A.C. motor were two O1-class units built in 1930, Nos. 7850 and 7851. Some O1's differed from each other in drive variations between motors and wheels, but basically all approximated the flexible spring- or gear-and-quill drive. Finally the Westinghouse gear-and-quill drive was jelled as the basic drive for passenger locomotives. The units were of the 4-4-4 or 2-B-2 type, and when operated in multiple they had enough power to handle the road's heaviest passenger trains. Singly, however, they left something to be desired. They were said to have "too much truck," for two-thirds of their wheels were idle and only 50 per cent of their total weight was on drivers and available for adhesive purposes. Their tracking was also not the best. Even at moderate speeds the O1's developed severe nosing or side-to-side thrustlike movement of the wheel flanges against the rails.

An O1 was tested on the Altoona locomotive test plant, long an exclusive domain of Pennsy steam locomotives, but it was the O1's road runs — the acid test — that put them out of the picture. Construction of class O1 was discontinued after eight of these locomotives had gone into service.

In view of the O1's power limitations and poor tracking, a new locomotive design was called for. So in 1931 two locomotives of class P5, Nos. 7898 and 7899 (later renumbered 4700 and 4791 respectively), made their appearance. They were 4-6-4's or 2-C-2's with three pairs of drivers in a 20-foot rigid wheelbase, and they went into passenger service on the newly electrified line between Trenton, N. J., and Wilmington, Del. Underlying their design was the desire to better the performance of the K4s-class Pacific. The P5's suggested steam locomotive practice by turning out 3750 continuous h.p. at 90 mph from just three pairs of large 72-inch driving wheels. Heavier rails were called for, but this posed no problem since the Pennsylvania already employed heavy rail section. The P5's were geared like the O1's for 90 mph and in their mechanical drive they basically resembled the gear-and-quill-driven O1's.

The sample engines did good work, and Pennsy felt encouraged to order 90 more similar units with some slight changes from the original two locomotives. The new locomotives of the P5a class were numbered 4701-4790. Meanwhile, by 1933, Pennsy mainline electrification had gone into operation between New York, Philadelphia, Wilmington, and Paoli. Here the new box-cab P5a's went into service as they came from the builders fitted with interchangeable Westinghouse and General Electric equipment. They soon were hauling, in addition to the "clockers," the top name trains to the South and West.

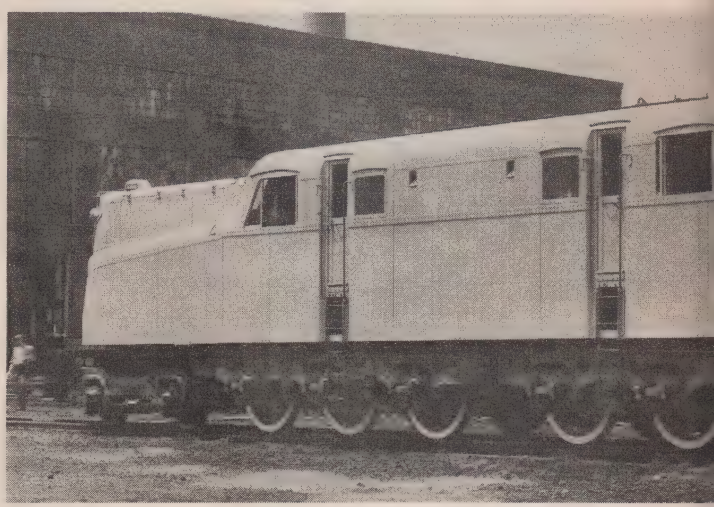
For the moment all seemed well: the trains were running to time, and passengers remarked upon the smooth soundless running as the box-cabbed electrics shuttled back and forth. They looked nice too, for there was the image of a powerful locomotive in their blunt-faced ends. But, alas, these locomotives, like their predecessors, the O1's, were not without fault. Their tracking, although it was a marked improvement over that of the O1's, was unsatisfactory enough to keep the Pennsylvania from speeding up passenger schedules following electrification. Then to really complicate things, cracks began to develop in the



Top photos, collection of H. L. Broadbelt.

GG1— the prototype

MINUS pantographs and paint, archetypal GG1 of 1934 — originally numbered 4899, later 4800 — stands outside Baldwin's Eddystone (Pa.) erecting shop. Baffle plate atop right side of hood on No. 1 end (left) automatically locked into position when pantographs were up to prohibit access to the top of the locomotive.



driving axles of the P5a's. The fact of two hefty twin motors powering one large 57-inch quill-mounted gear and giving out at times with bursts of power reaching 2000 h.p. per driving axle was thought by some to produce a "torque" or twisting effect that was just more than the axles could stand.

When this crisis arose the Pennsylvania immediately took steps to ensure the safety of the traveling public. Passenger-train speed was rigidly restricted to 70 mph, a figure which experience and close investigation showed left an adequate margin for safety. But now what was to be done? This restriction of speed rubbed out one of the big reasons for electrification; such a condition could nullify one of its biggest anticipated benefits — speedier passenger train operation. In fact, new timetables with shortened schedules between New York and Philadelphia had already been prepared and were ready for the public, but now things were blocked.

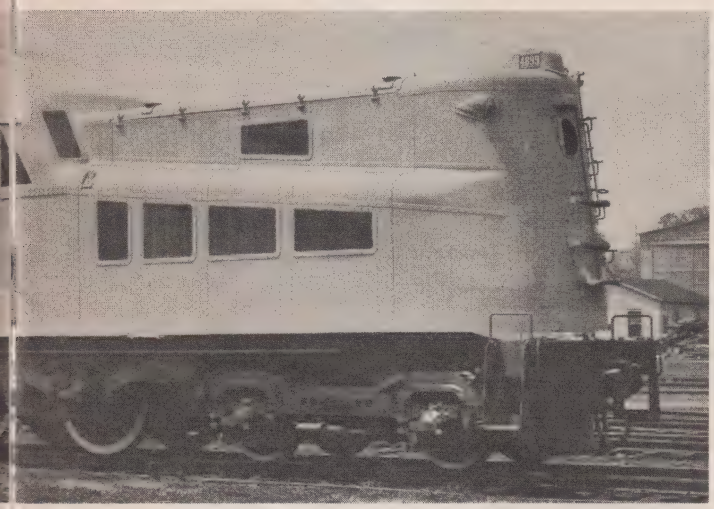
The immediate task was to entirely redesign the P5's axles with special attention to fillet points where the cracks seemed mostly to develop. All of the driving axles of the P5a's were removed and replaced with new ones of enlarged diameter. Many K4's were recalled to fill the gap left by this temporary removal of P5a's. K4's lustily took over to keep traffic moving while the P5a's were rapidly re-axled and put back into service. The newly re-driver-axled P5a's took over again, but their tracking troubles remained.

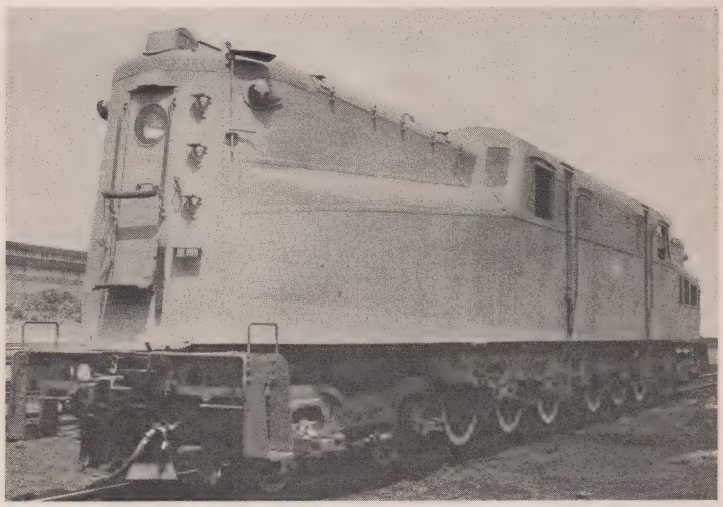
At this point the Pennsylvania's management set up a track-testing program to find out why some electric locomotives had better tracking qualities than others. A special section of track at Claymont, Del., was prepared to measure the lateral impact forces made by the locomotive wheels against the rails. Results were analyzed and they revealed what was happening on the P5a's during operation. Changes were made in the truck equalization system, and a short series of test runs with a revamped P5a showed that acceptable operation had been achieved.

But the Pennsylvania thought that even better riding qualities were possible, so the investigation continued with the loan of one of New Haven's latest electric locomotives, class EP-3a No. 0354. This box-cab locomotive was of the 4-6+6-4 or 2-C+C-2 type with an articulated joint between each group of two driving trucks.

General Electric had built locomotives with such an articulated wheel arrangement in 1929 for the Cleveland Union Terminal. These machines used a direct twin-gear-and-pinion drive (one gear on each axle end), but the New Haven locomotive used the twin-motor drive, long a feature of NH electrics. Former Chief Electrical Engineer Sidney Withington of the New Haven, an able electrification man, had much to do with the creation of No. 0354 and the class itself. Down to the Pennsy's Wilmington Shops went No. 0354 where it was regeared for a speed of 120 mph.

When this locomotive was run over the test track ties it showed outstanding reduction in lateral forces. Two explanations were possible. The lateral force reductions could have been due entirely to the lower driver axle loadings of the NH machine. The New Haven locomotive carried 272,000 pounds on its 12 drivers, whereas the P5a carried 220,000 on but 6 drivers. Another explanation was





ON TEST at Claymont, Del., GG1 accelerated a single coach from a dead stand to 100 mph in 64½ seconds, a feat which called for a maximum of 9300 rail h.p. She also proved far easier on the track than R1 rival.

Bottom photos, collection of Frederick Westing.

ON her 25th birthday the original GG1 received a plaque from the NRHS.

Raymond Loewy and the GG1

I *CREDIT for turning the original GG1's heavily riveted, awkwardly striped look into the smooth, fleet appearance of later production models belongs to industrial stylist Raymond Loewy. Actually, the GG1 was one of his first major industrial credits, and the tale of how he won the assignment is delightfully recounted in his autobiographical* Never Leave Well Enough Alone *(Simon & Schuster, 1951). In this excerpt Loewy tells of his meeting with PRR President Martin W. Clement and Chief of Motive Power F. W. Hankins:*

"Show him that picture," said Clement.

The photograph represented the prototype of the giant new electric locomotives, the famous GG1 familiar to all those who travel between New York and Washington.

I took one good look at the photograph, trying to act calm in spite of my excitement. Clement said to me:

"This is a good locomotive. We just built it as an experiment. We are going to build more. See anything wrong with it?" I saw plenty but I was on the spot. I could hardly criticize it too harshly in front of the man who probably had developed it, and yet it did not look good. It had a disconnected look; component parts did not seem to blend together, and its steel shell was a patchwork of riveted sections. It looked unfinished and clumsy.

"It looks powerful and rugged," I said, "yet, I believe it can be further improved, and I would like to borrow this print for a few days."

"Can he have it?" said M.W.C. to Hankins.

Hankins nodded reluctantly.

"Go ahead, Loewy. And take it easy."

"Mr. Hankins," I said, "I may have to ask some technical questions of your engineering staff. Whom should I see?"

"Me."

I left in a daze, overjoyed and thankful to these men, great leaders and engineers who had enough confidence to give me their time and such an opportunity to prove myself.

I rushed back to the office and announced the good news. We were delirious. I had already studied the photograph during the train ride back to New York, and it became increasingly clear that a grand job could be done.

First of all, I was thinking in terms of simplification. I wanted to show these men that I was no long-hair artist trying to pretty up a 6000 h.p. locomotive, but a realistic designer with practical sense. The first step would be to suggest welding of the shell instead of riveting. This would eliminate tens of thousands of rivets, simplify the appearance, and lower the manufacturing cost. Then we would work on details and accents.

I went back to Philadelphia to ask technical questions without divulging my aims. After checking and double-checking every angle for practicality we were ready. We completed our design in a few days, a magnificent airbrush rendering was prepared, and the great meeting took place with M.W.C. and Hankins.

The design caused a sensation — and a shock. A welded locomotive? What's the idea! Does he think he is designing automobiles? Really! The nerve of some people!

I lay low and hoped for the best, trying to weather the silent hurricane. My heart was in my mouth. The meeting was short and I returned to New York not knowing what to think. Then no news. I went back to Philadelphia. Nothing for me. More trips, and nothing but a vacuum. Dejected, I dropped in at the engineering department to say hello to one of the draftsmen who had helped me. Lightning seemed to strike me! What did I see on the board but *my* locomotive being drafted!

Fred Hankins saw me. "We are going to build a full-size mock-up of your design. In a couple of weeks I want you to come with me to Wilmington and we will look at it together, Loewy. And take it easy."

In my excitement, the one thing beyond my capacity was to take it easy.

We went to Wilmington. The locomotive, 90 feet long, was magnificent. Hankins was delighted. All the workmen liked it, always a good sign, and in spite of my efforts I found little to criticize. However, a few details were to be corrected: a radius here, a highlight there, a window corner, a recessed handlebar, etc. I had brought along a large roll of white adhesive tape and colored chalk.

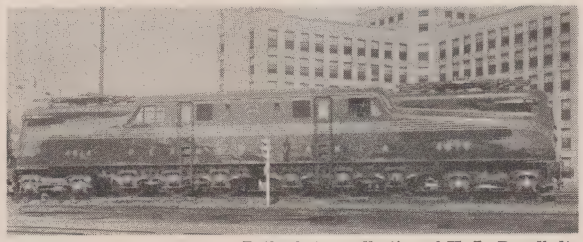
"Mr. Hankins," I said, "I would like to make a few suggestions and it would be best if I could do it right on the mock-up instead of on a sketch. Do you mind if I go to work right now?"

"Go ahead."

I took off my overcoat and with the help of a crew and some tall ladders I began to make corrections. I knew exactly what I wanted, and did it with calm and precision. There was no hesitation on my part and Hankins, who was watching me, looked deeply interested. Groups of men were observing me perched on top of the mock-up, stretching tape, making chalk marks, and writing instructions on the surface of the shell. I could feel that my audience was convinced. The corrections were obvious improvements and all realized that I knew what I was doing.

We returned to Philadelphia. Hankins was friendly and happy, and I went on to New York. Eventually 57 of these locomotives were built at a cost of 18 million dollars.

Years later, it turned out that the welding process had saved millions of dollars. Besides, maintenance of the locomotives has been made easier on account of the smooth surface resulting from the absence of rivets. The welding technique is now universally adopted. I



Both photos, collection of H. L. Broadbelt.

that the 4-6+6-4 wheel arrangement's flexible articulated joint connecting the two driving wheel groups accounted for the improved riding and that driver axle loadings were relatively unimportant.

Regardless of the reason, the "double-jointed" New Haven 4-6+6-4 stole the show. It rode exceptionally well and was much easier on the track than the P5a's. The implication was not lost on the Pennsylvania, which elected to build a locomotive of the same 4-6+6-4 articulated type. The railroad felt electric passenger locomotives of greater capacity were needed. The Pennsylvania was convinced that in the years to come train weights would incline upward, and events fully justified that viewpoint.

The order for the 4-6+6-4 type sample locomotive went to General Electric for the electrical equipment and to Baldwin for running gear. Really two Ten-Wheelers back-to-back in steam locomotive parlance, the locomotive was known as class GG1, with the letter G standing for a 4-6-0-type PRR locomotive classification, the 1 indicating the first of this standard class.*

While the New Haven 4-6+6-4 locomotive served as a base for the GG1, a "from scratch" approach in the building of this first GG1 was called for by different operating conditions. Careful design and construction of this original design hopefully would set the pattern for the passenger locomotive wanted by the Pennsylvania. Even so, there were some sturdy advocates of the P5a drive and the idea of high power per driving axle with fewer axles. Thus an order was given to Westinghouse for the electrical gear for a class R1 4-8-4 or 2-D-2 rigid frame locomotive similar to class P5a but of greater power.

Both locomotives were built by the Baldwin Locomotive Works at Eddystone, Pa., and this organization was responsible for the mechanical parts of both units. It was a co-operative arrangement with Pennsylvania, Westinghouse, General Electric, and Baldwin all working together along with Gibbs & Hill, who were the engineers for the whole electrification project. The designing and building of these two experimental locomotives were done on a crash program basis. Pressure for speed was behind the project and all concerned worked mightily and successfully to deliver.

In line with prevailing fashion the cabs designed for the GG1 and R1 were streamlined with a sort of box and steeple-cab arrangement. The heaviest and most vital equipment was housed in the central, or box-cab, section where aisles on both sides gave ready access for maintenance. Hoods at each end supported the pantographs and housed some auxiliary items. The end of each hood had a neat rake or inward slope toward the top. Doors at each hood end were also set to this inclined angle. A clever arrangement patented by a Baldwin man allowed these doors, despite their angularity, to be completely opened inward.

Of equal importance was the relocation of the engine crew to the center of the locomotive. A fatal grade crossing accident in January 1934 at Deans, N. J., between box-cab P5a No. 4772 and a large truck had made the enginemen conscious of the exposed head-end cab location. Accordingly, some 28 locomotives of class P5a, still on order, were completed with streamlined cabs that put the crew in the center of the machine. These locomotives were known as modified P5a's and afforded a greater margin of safety in the event of a highway collision. There was much talk about the GG1 cab material — should it be aluminum or steel? Some Pennsy men favored aluminum, claiming that its lighter weight would compensate for its higher initial cost through less current consumption per year. But a riveted steel cab was settled upon, and the design proceeded.

*It has sometimes been stated that the GG1 got its classification from the initials of George Gibbs, the consulting engineer and founder of Gibbs & Hill, who was for many years associated with Pennsylvania Railroad electrification projects. This notion could have stemmed from a plaque in the 30th Street Station, Philadelphia, which mentions "George Gibbs whose vision and tenacity of purpose led to the development of the Pennsylvania Railroad's articulated electric locomotive." At the bottom of the plaque is a bas-relief showing engine No. 4800, the first GG1. Those not familiar with the Pennsy's use of the letter G for designating a 4-6-0 locomotive may have assumed a tie-in between George Gibbs, his initials, and the GG1. But the implication was inaccurate, if romantic.

EARLY in 1934 the new 4-6+6-4 electric locomotive numbered 4899 stood completed and ready for road tests. Like the borrowed New Haven locomotive, the GG1 possessed two independent driving units under one cab. Each driving unit consisted of a cast steel underframe that had three driving axles, with a four-wheel truck at the end. The two driving units were connected with a ball joint similar to that used on Mallet steam locomotives.

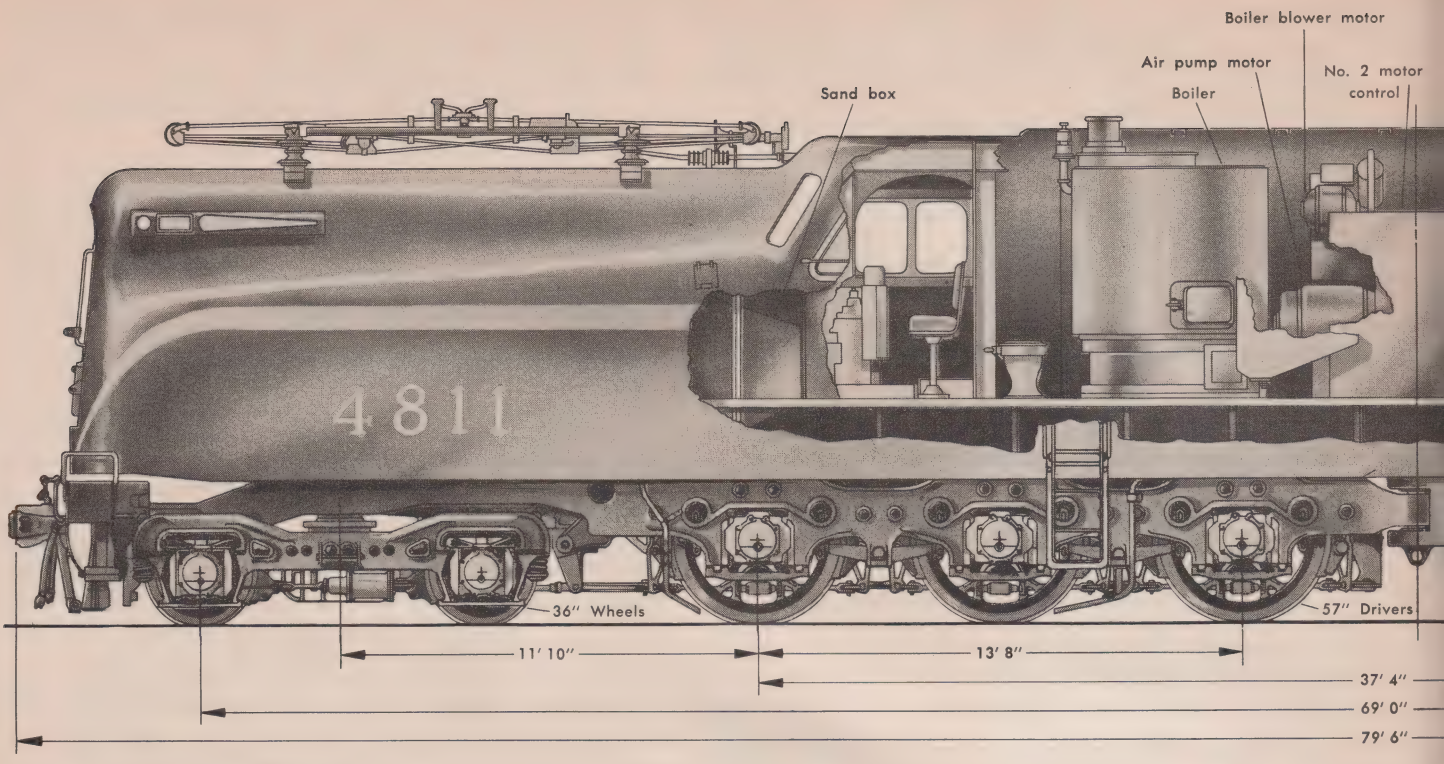
The cast steel main frames had an extension which reached to the center bearing of the four-wheel truck. This gave the wheels three pivotal points, and the rigid wheelbase was 13 feet 8 inches. The cab was pivoted at two points — one on each side of the main frame — about 45 feet 11 inches apart. This method of support minimized the side movement of the body but allowed a flexible wheel arrangement that was easy on the track when taking a curve at speed. Spring-mounted side bearing plates supported the body and permitted side movement.

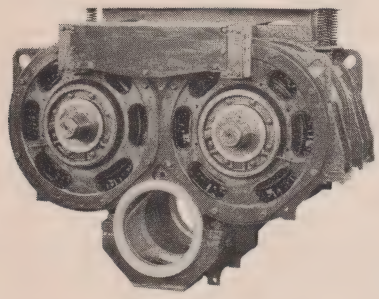
Two side trusses made up the inner structure and rested on heavy cross members that supported them at intervals. Between the lower deck and the cab floor was a series of conduits to carry air from the blowers in each hood to the transformer and traction motors. Motor power depends upon the ability of the blowers to keep motors cool. Inside these bridgelike trusses were located bases for the Altoona-built vertical firetube, oil-fired train-heating boiler (with a capacity of 4500 pounds of steam per hour at 200 pounds pressure); the transformer; and other apparatus. In the early O1 and P5 days, Baldwin and Pennsy checked into the feasibility of an electrically heated boiler. But tests showed that the amount and cost of current to meet the demands far outweighed the disadvantages of the more complicated oil-burning boiler and its need for valuable space plus its additional weight to store (for the P5a) 465 gallons of oil with a weight of 3500 pounds.

The GG1 cab interior was so filled with equipment that there was little room to stroll around. For instance, there were the water tanks with a capacity of 2715 gallons weighing 22,730 pounds; the oil tank stored 391 gallons weighing 2933 pounds. These tanks were located in the end hoods and were of such shape that they would fit around struts and into corners not otherwise occupied. Space under the "hips" of the hoods was found suitable for such storage. Eight sandboxes had to be placed between the truss members so they would not take space needed for electrical and other apparatus. Two shutterlike louvers on each cab side provided air for the compressor and helped to dissipate heated air which was created by the transformer.

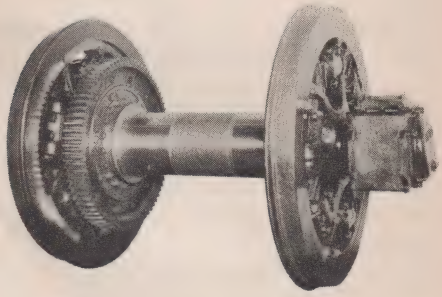
Although its two ends are alike in external appearance — as with many electrics — the GG1 has one end known as a "front" or No. 1 end (this is shown by the small letter "f" on each side of the cab bottom). The other is known as the No. 2 end. For identification purposes the locomotive was divided at the cab centerline between the two driving trucks. In the No. 1 end was the steam generator and No. 1 hood; the No. 2 end housed the transformer, tap switches, and No. 2 hood. These designations aid in quickly locating parts in need of inspection or repair. With each hood end housing some identical equipment, the value of pinpointing the location is apparent.

The cab had hatch openings and covers on the roof that were large enough to allow such heavy items as the transformer, boiler, and other accessory parts to be lifted out bodily. At each hood end a "baffle" plate such as those used on the P5a's kept anyone from climbing the hood

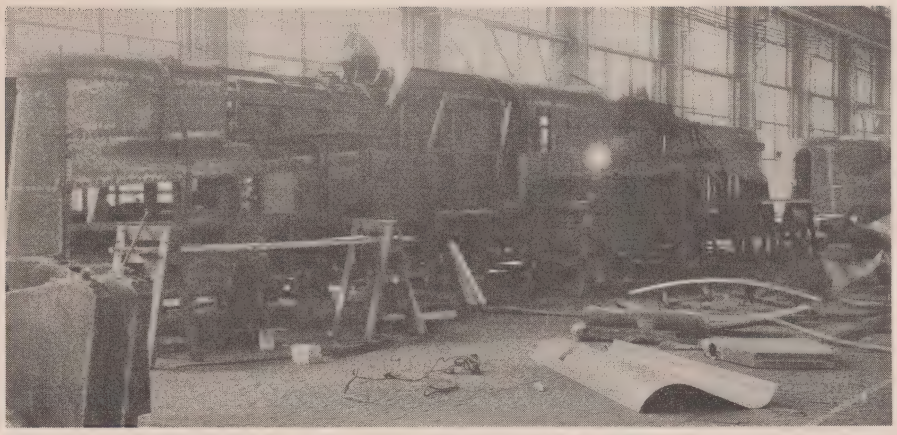


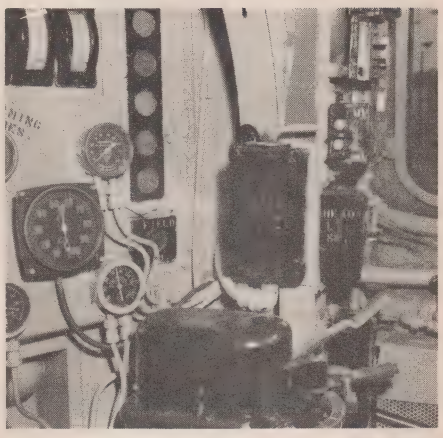


GG1—under the skin



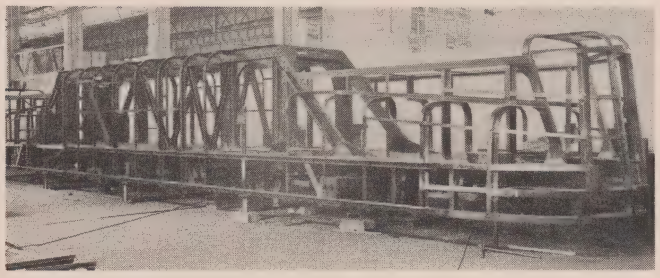
TWIN A.C. traction motors in a common frame (left) power each driving wheel assembly (right) of a GG1. Spring cup drive was applied to each driving wheel whereas on O1 and P5 predecessors only one wheel per driving axle had the cup drive.

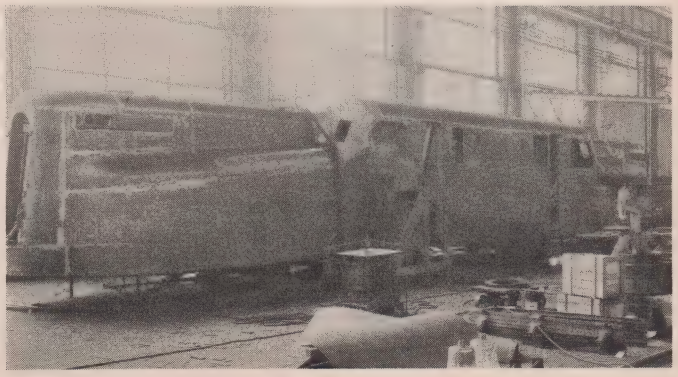




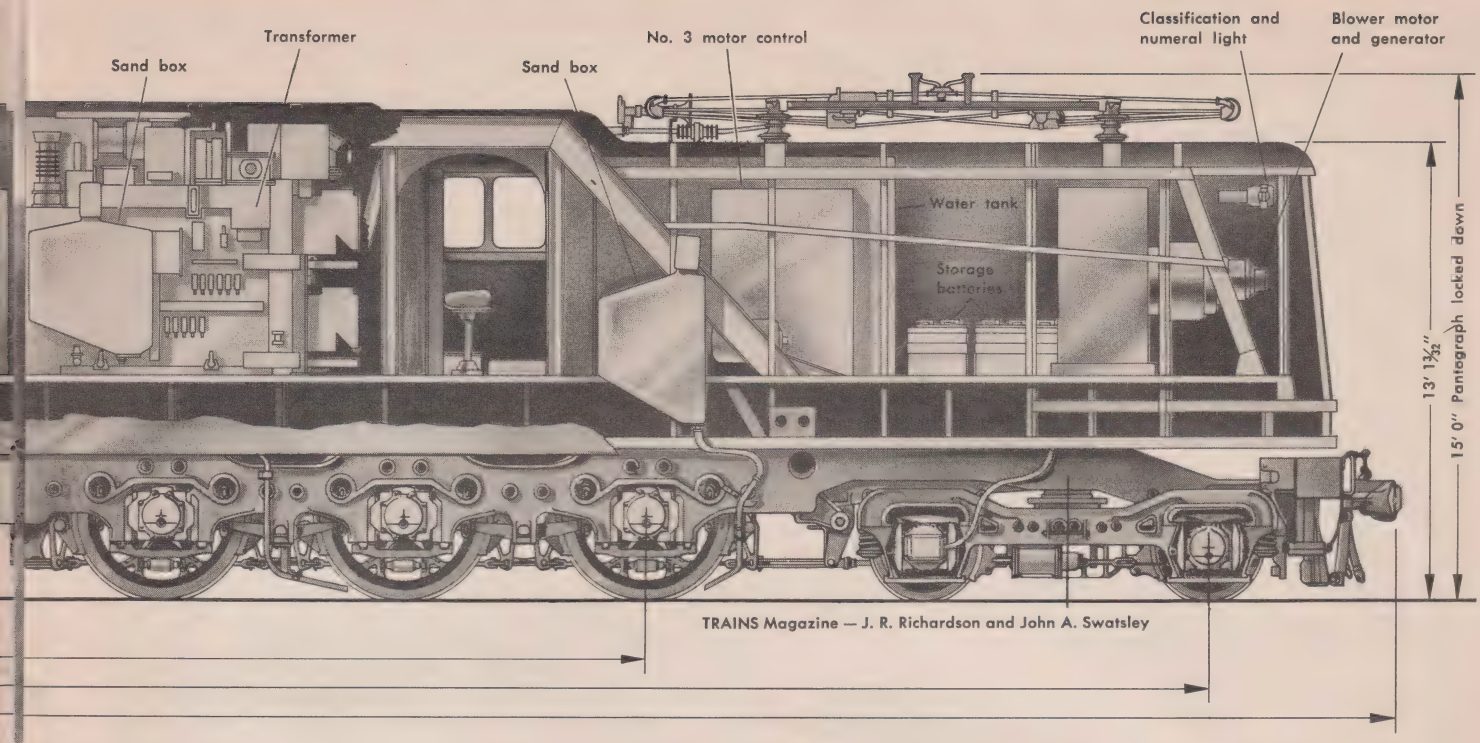
Except as noted, all photos collection of Frederick Westing.

Don Wood.





TRUSS-LIKE construction of carbody and central location of operating cab gives GG1 enginemen unexcelled protection and reasonable visibility. Welding replaced riveting in production units.



steps to the roof while the pantographs were energized. On subsequent GG1's a ladder inside each hood gave access to the roof through a trap door. By means of an electrical interlocking arrangement this door could not be opened when the pantographs were "hot."

A twin motor drive similar to that of the P5a's, but much smaller, was used. Two 385 continuous h.p. motors in a single fabricated frame with their pinions driving a single gear were mounted on a quill. In this drive all of the GG1's motors were entirely spring supported, which is not the case with the direct nose-suspended motor drive used on most diesels. This latter drive contains much unsprung weight which can be injurious to the track and tends to make a rougher riding locomotive. The GG1 drive makes for smoother riding and eases stress and strain on the track.

The GG1 drive had a "spider" (the part that projected the driving elements between the wheel spokes), with six sets of spring cups giving a most flexible connection between the gear and wheels. (Later rubber cups were used in place of springs.) This drive gave a cushioning effect by dampening out the necessary vertical movements in the axle boxes — a sort of "floating" drive.

Unlike the O1 and P5a locomotives which drove the driving wheels on only one end of the axle, the GG1 with two spring-cup drives on each end of the quill powered both driving wheels on each axle. This application gives a more even distribution of the two motors' power on each axle. With the idle or dead end of the axle heavily laden, as it was on the P5a's, and the train load (depending on its weight) making it more difficult to move, the effect of the terrific blasts of highly concentrated super power lumped onto one axle and conceivably caused an excessive twisting effect between the live and dead axle ends. Later the same axle stresses occurred with the P5a's when they went into freight service. Cracked axles once again appeared when certain speeds and power ratings were exceeded, and strict observance of the rules governing such operation had to be maintained.

The size of the driving wheels called for thought, for consideration must be given to brake fittings, air duct construction, and so forth. The New Haven 4-6+6-4 locomotive had 56-inch drivers, but the Pennsy decided upon 57-inch driving wheels — all to be flanged. The driving wheels of electric locomotives, though small, can be geared to match the speed of the larger direct-drive wheels of steam locomotives.

Ventilating air entering the hoods through louvers supplied two 55 h.p. motor blowers (one in each hood) and forced air into the ducts directly to the traction motors. The transformer on this first GG1 was exclusively air-blast cooled with about half the air from each blower doing the job. One air compressor with a capacity of 150 cubic feet per minute pumped up the air brake system and electropneumatic control tank. It used a worm-gear drive driven by a 35 h.p. motor. This auxiliary apparatus — blowers and air compressor — was driven by single-phase induction motors with power tapped off the main transformer's secondary. Their ruggedness, simplicity, and speed characteristics made them exceptionally suitable for this work.

The traction motor with three-point suspension was of interest. It was nearly the same as those used on the Pennsy M.U. cars and had the same power rating. Adjustment allowance kept the quills central with the axles. Only slight changes were needed to allow its use on a locomotive. There were three motor circuits with four motors in each circuit. Thus if a motor failed, that circuit could be cut out and the other two could carry the load. In fact, this big GG1 could be likened to a complete multiple-unit train with 12 traction motors concentrated in a single chassis.

The GG1's traction motors were of the commutator type, series connected. The revolving part is the "armature," and the stationary part which includes the main field and compensating and interpole field windings is known as the stator. The series motor is excellent for railroad locomotives, for its torque depends on its speed. Less speed produces a greater torque or turning effort, and an increase in load causes the motor to slow down, thereby increasing the counter e.m.f. (electro-motive force) while it increases the field and armature currents. So with a greater load the series motor gives out with more torque, or tractive force, when most needed. On a series motor the torque will be nearly proportional to the square of the armature current, and such motors are well known for having

strong starting and operating torques. Just as a steam locomotive adjusts itself to the load — a heavier load means a heavier exhaust blast for a hotter fire and more steam — so does the series traction motor adjust to variable conditions automatically.

Each pair of GG1 motors was carried by a rolled-steel built-up frame. Armature shaft roller bearings are supported by end bells. At one end of each motor is a pinion that meshes with the quill-fastened gear. Bearings in the lower part of the motor frame support the quill which rotates within them.

Duct connections at the top of the twin motor frame allow the entrance of air for cooling the motors. Air to the armatures and stators is distributed by inside ducts and then is discharged through openings in the end bells or lower half of the motor frame. Surrounding the gear and pinions was a built-up gear case split horizontally in two parts through the gear center designed to keep out dirt and to contain the lubricant.

Roller bearings, also employed on the O1 and P5a classes, were used throughout on this first GG1. The inner race was pressed onto a ground fitted on the axle and the bearing assembled in the special boxes which gave vertical movement as on steam locomotives.

Meanwhile, the 4-8-4 R1, bearing road number 4800, was completed, and— to get a clear picture of the tracking qualities — competitive runs were arranged on the special test track section at Claymont. Special test ties had been installed for a distance of 440 feet on southbound passenger track No. 4 near Claymont on the mainline between Philadelphia and Washington. These ties came from a batch of about 300 which the Pennsylvania had made some years before, and each one was arranged to measure horizontal impact forces on the rail. Basically this was done by the running rail's forcing a hardened steel ball into a removable soft iron bar in a way quite like the Brinnell hardness tester. Measurement of the indentation diameter gave an indication of the force applied to the rail.

Techniques for using strain gauges for making stress measurements had meanwhile advanced enough to allow the electrical manufacturers to build and install a system of "weigh bars" on the GG1 and the R1. These combined with specially built journal boxes permitted continuous records of the lateral forces on the end of the locomotive axles to be obtained. Multi-element oscillographs and long rolls of sensitized paper gave permanent records of the results. In this way the riding characteristics of a locomotive as indicated by the Brinnell ties under the rails could be directly correlated with flange forces generated on the locomotive and shown by the weigh bars. This instrumentation called for hauling a test car which housed the oscillographs and auxiliary equipment needed to make the measuring system operate.

Right from the start the GG1 showed itself to be a remarkably smooth-running locomotive. The weigh bars and various instruments gave permanently recorded results that proved GG1 No. 4899 superior to all competition. The R1, however, backed by its motor rating of 5000 continuous h.p., turned out to be a tough competitor in speed and tracking — despite its rigid 23-foot wheelbase of four 62-inch drivers. But it never matched the GG1 in reduced side-to-side impacts on the rails. This better tracking meant safer running at the speeds contemplated, and that was the paramount consideration of the Pennsylvania management: safety at speed. This the GG1 furnished abundantly. The GG1 showed that the impressions which it made on the track due to sidesway rose slowly at high speeds, as with the New Haven locomotive which it closely resembled. At a speed of 100 mph the impression depth was less than 0.035 inch. At this speed the GG1 was moving 30 mph faster than the original P5a for the same rail impression, and 20 mph faster than the modified or improved P5a. The impression depths made by the GG1 were clearly much less with an increase in speed than those made by the P5a's or even the R1.

In point of speed the GG1 was superb. Speeds of 115 mph with passenger trains were made near the test track section. On many test runs the GG1 and its trailing car were accelerated to 100 mph in 64.5 seconds from a dead stop, or at an average rate of 1.55 mph per second. This called for peak power outputs of 9300 rail h.p. — equal to 11,000 diesel locomotive h.p. owing to the latter's transmission losses from engine and generator to traction motors.

At the end of the tests the GG1 and the R1 went into passenger service, but the R1's stiff-legged wheelbase prohibited it from certain mainline localities and it was never duplicated. It was usually seen on the New York-Paoli run and later ran between New York and Harrisburg when the Philadelphia Division was electrified to that westernmost point in 1938. The GG1, on the other hand, could safely run anywhere with tracking ease.

Meanwhile in 1934, the GG1 and the R1 had swapped

GG1 GLOSSARY

Road numbers	Year built	No. built	Wt. on driv. (lbs.)	Wt. on trks. (lbs.)	Total wt. (lbs.)	Cont. h.p. (a)	Starting trac. force (b)	Gear ratio	Speed (mph) (c)
4800	1934	1	303,000	172,000	475,000	4,620	70,700	24:77	100
4801-4857	1935	57	300,000	160,000	460,000	4,620	75,000	22:79	90
4858-4862	1937	5	303,000	174,000	477,000	4,620	70,000	24:77	100
4863-4868	1938	6	303,000	174,000	477,000	4,620	70,000	24:77	100
4869-4871	1938	3	300,000	168,400	468,000	4,620	70,000	24:77	100
4872-4888	1939	17	300,000	168,400	468,000	4,620	70,000	24:77	100
4889-4908	1940	20	303,000	174,000	477,000	4,620	70,000	24:77	100
4909-4910	1941	2	303,000	174,000	477,000	4,620	70,700	24:77	100
4911-4928	1942	18	303,000	174,000	477,000	4,620	70,700	24:77	100
4929-4938	1943	10	303,000	174,000	477,000	4,620	70,700	24:77	100

Total — 139

(a) Traction motors can exceed continuous horsepower by 100 per cent for short time.
(b) Starting tractive force at 25 per cent adhesion.
(c) Speed at 4,620 continuous horsepower.

(Above data represents official specifications.)

road numbers; the former became No. 4800, the latter No. 4899. Later when more GG1's were added to the fleet one of them appropriated No. 4899, and the R1 then became No. 4999 which it carried to the scrap heap. The R1 had the distinction of carrying three road numbers during its career, as well as being the only Pennsylvania locomotive of the 4-8-4 type.

Before putting No. 4800 into regular passenger service, a demonstration run was made on January 28, 1935, from Washington to Philadelphia and return. This was the first time an electric locomotive hauled a passenger train out of Washington, D. C. During the runs the GG1 broke previous speed records between these points. The train carried 128 passengers — top-ranking Pennsylvania Railroad officials and Federal and state government guests. Nine cars made up the all-steel train's consist. Northbound, the 134 miles were run off in 128 minutes, with a 3-minute stop at Baltimore. Southbound, the time taken for the same distance was only 110 minutes. During this latter run a speed of 102 mph was reached and held without difficulty. The average time for this run was something over 73 mph, surpassing by one minute the famous *Lindbergh Special* steam-powered two-car-train run made in 1927 between these two cities. No attempt was made to push the prototype GG1 to its limit of power and speed.

When through electrified passenger-train operation was inaugurated between Washington and New York at 4 p.m. on Sunday, February 10, 1935, the first northbound train was once again hauled by GG1 No. 4800.

Initially, the belief was that the GG1 might be more costly to maintain than either a P5a or an R1. Consider one small item — spring cups. With the double-end drive on the GG1 using 6 spring cups per wheel or 12 for the pair, 72 spring cups in all were employed. This item alone could have meant greater maintenance costs. But the P5a with only 24 cups had to transmit 156½ h.p. per cup; the R1 with 28 cups transmitted 143 h.p. through each cup; but the GG1 only transmitted about 64 h.p. per cup. Evidence showed that the P5a's, which had been running for some time, had had many worn and broken cups. From this it was deduced that the greater power transmission per cup substantially shortened their life, and that the GG1 with more cups — but transmitting only about 40 per cent of the power per cup needed by the P5a's — would not be as costly in the maintenance of this detail.

Traction motors constituted another high-maintenance possibility. The GG1 had 12, against 4 for the O1, 6 for the P5a, and 8 for the R1. But the O1, P5a, and R1 motors developed 625 h.p. each to achieve their continuous h.p. ratings of 2500, 3750, and 5000 respectively. Each GG1 motor only had to produce 385 h.p. to obtain 4620 cumulative continuous h.p. per locomotive. This reduced their individual motor power requirements and made for less wear and tear per motor. It also meant that the GG1's motors were smaller and lighter, so that maintenance techniques tied in with those already used in the repair of M.U. car motors.

So the Pennsylvania was satisfied that the GG1 was the locomotive PRR wanted for present and future needs. Thus 57 additional locomotives of this class were ordered early in 1935. They were numbered 4801-4857, and by August 3, 1935, the last of them had been completed. On these locomotives as well as on the GG1's that followed, Westinghouse and General Electric supplied the electrical equipment, and components made by one company were interchangeable with those of the other.

These 57 GG1's differed from No. 4800 in having welded rather than riveted cabs. However, butt straps and belt rails were eliminated. The front steps on the pilot beam sloped back while the lower edge of the cab sheets were rolled inward. The end hood doors had a rounded top which added to the streamlined effect. A pleasing and striking touch was given to the GG1's by the striping arrangement. Five lines, 1 inch thick, were painted in gold leaf on each side of the cab blending into a neatly rounded and thinning "cat's whiskers" striping at each end of the locomotive. This replaced the tentative striping that first appeared on No. 4899 and remained for a while after it became No. 4800. All of these esthetic improvements could be credited to industrial stylist Raymond Loewy who also streamlined Pennsy's first steam engine, K4 3768, and was responsible for the design of the S1 6-4-4-6's and the yacht-nosed T1's. (During the GG1's career the style of lettering on its cab sides has been changed three times. For a while one motor, No. 4826, had a different striping in place of the full-length five-lined stripes. Later, some GG1's had the whole cab painted Tuscan red — Nos. 4910 and 4911 were two. Some were painted a silver gray, but all are now back to the old Pennsy standard Brunswick green.)

Electrically and mechanically these 57 locomotives more or less duplicated No. 4800, except that a new type of main transformer was used. Unlike No. 4800's transformer which was entirely air-blast cooled (a "dry" transformer was somewhat lighter for a given capacity), the new GG1's had liquid-cooled main transformers combined with air-blast cooling. As on No. 4800, half of the air from each blower was supplied to the transformer. This method of liquid-and-air cooling proved more effective and was used on all GG1's built after No. 4800. After all, the weight difference in favor of the dry transformer was only 500 pounds for the same capacity.

The transformer is vital to an A.C. locomotive using high trolley wire voltage because it steps down this pressure to a voltage that the traction motors can absorb. This device is one of the most successful ever made, for its efficiency is high with over 90 per cent of the current fed to it going out as tractive force at the wheels. This one piece of equipment takes the place of several diesel engines in horsepower rating and soaks up and delivers kilowatt hours in a way that makes the GG1 the great performer that it is.

In a GG1 transformer, current is first fed to the primary or "high-tension" side, then through mutual induction produces currents at predetermined voltages in the secondary or "low-voltage" side. Here tap switches, operated from the engineer's low 32-volt D.C. master controller circuit, feed current to the traction motors. When notching up the controller handle the undesirable effect of open circuits when passing from one notch to another is avoided by preventive coils. To arrange for proper sequence of the tap switches or contactors, interlocks are used to avoid misfunctioning of the control equipment.

Ammeters in each operating cab showed the amount of current or amperage consumed by the three traction motor circuits. Ammeter readings are important since different locomotives have a maximum reading which if passed can damage the equipment. Close by was a vertical panel of several discs which lighted up when any condition needing correction took place. On these translucent "bull's-eye" warnings appeared such notices as BLOWER STOPPED or DRIVERS SLIPPING. On locomotives with independent driving axles, such as the GG1's, one pair of wheels may slip while the others do not. In such a case, when the difference in speed between the slipping and nonslipping drivers reached a certain figure, say, between 5 and 15 mph, the panel disc lighted and a buzzer sounded to further alert the engineer so that he could correct the situation before the speed differential reached 15 mph, at which speed the wheel-slip relay tripped and opened the motor switches.

Another ingenious idea — used only on the GG1's — to increase the voltage and current applied to the motors in smaller amounts between the regular notches was the

Both photos, Don Wood.

GG1—fresh from Wilmington Shops

"buck and booster" arrangement used on the controller. It kept the flow of power at a more steady level that helped in accelerating a heavy train to road speed — especially when the rails were wet.

When operating, the rear or trailing pantograph of the GG1 was usually raised. If this pantograph became damaged or dislodged while running and the trolley was still intact, the forward pantograph could be raised and the locomotive could then proceed. But if the forward pantograph was raised and it fouled or damaged the trailing one, then the locomotive would be inoperative.

If on the road a hole developed in one of the pantograph's two shoes and it snagged into a hard spot in the trolley wire and tore the wire down, there would be a delay but not a total stoppage of the line or even of that particular track. Because the trolley wires were sectionalized or isolated between interlocking towers and substations — allowing trains to pass around a dead trolley section until the damage was repaired — the locomotive and train with the broken pantographs could be towed or pushed a comparatively short distance to the adjacent "live" trolley section. Here another electric locomotive would replace the damaged unit and pull it and the train to its destination.

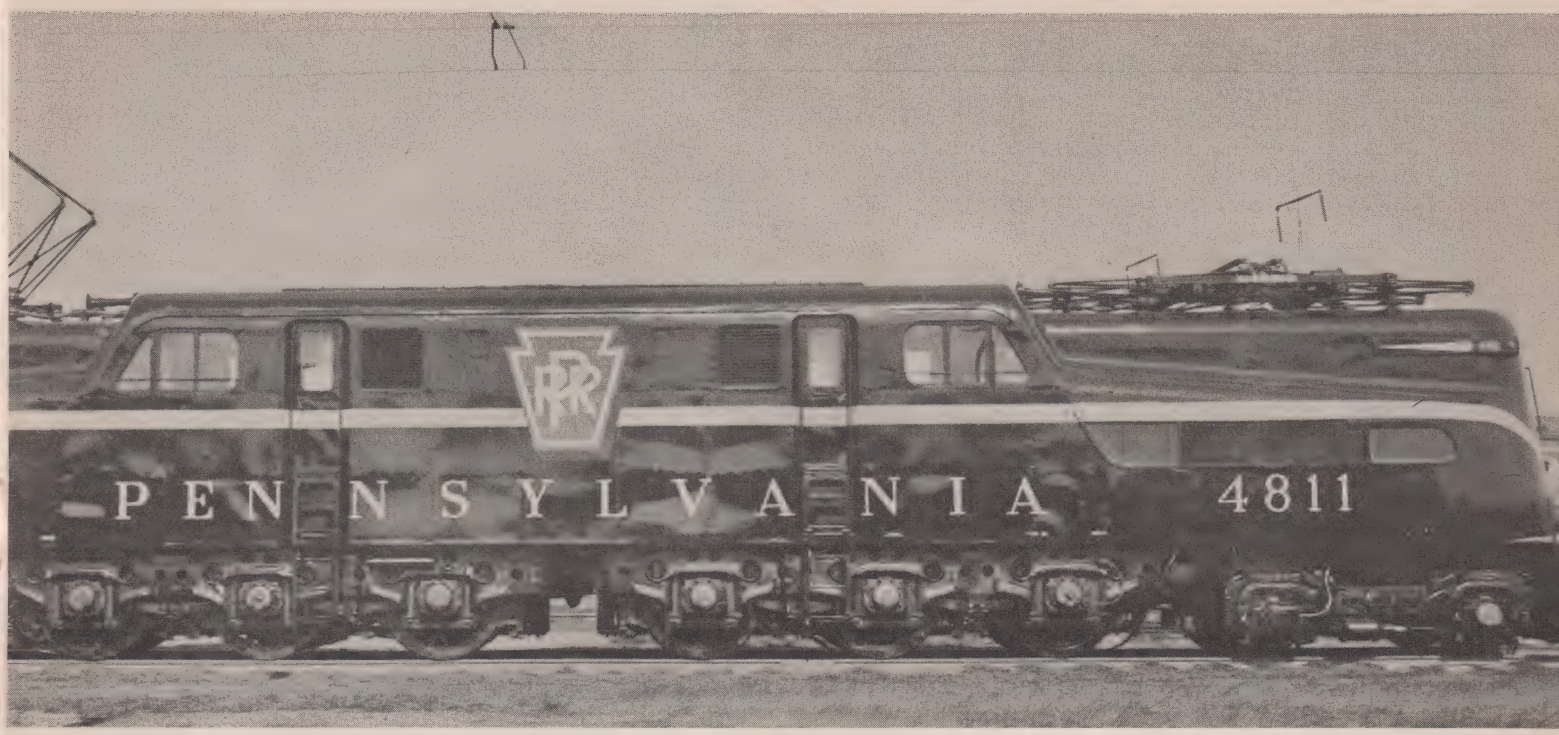
At station stops the fireman checked the pantographs, especially the shoes, to see if holes had worn through them. If so, he notified the engineer, who lowered the trailing pantograph and raised the forward one, enabling the train to continue. Sometimes during sleet storms, both pantographs were raised to allow the forward one to act as a "sleet scraper" and to permit better contact for the shoes of the trailing pantograph. At certain spots such as phase breaks, however, warnings were posted because here only one pantograph was allowed to make contact.

Pantographs on a GG1 were spring-raised and air-lowered. A locking device held the pantograph down when it was not in use. Air from the control reservoir was fed to a cylinder which was charged when the UP button in the cab was pushed. This released the catch, and the pantograph was raised by about 35 pounds spring pressure and fitted snugly against the trolley wire. If the control reservoir air failed, a hand pump could be used to unlatch the cylinder catch. A long wooden pole known as the "stick" was used to raise or lower the pantograph if the air-powered devices failed. The pole was kept under one side of the cab cowling in a long metal tube.

The first 57 GG1's differed from No. 4800 in their gearing. These units, Nos. 4801-4857, had 90 mph gearing instead of the 100 mph gearing of the 4800. This group of lower-speed locomotives was popular with the men, and it was said that up to 30 mph these units could pick up speed faster than the newer GG1's built since 1937, which had 100 mph gearing. But the 100 mph gearing allowed lower motor speed, and at 100 mph such a motor was rotating only as fast as the earlier GG1's traction motors were revolving at 90 mph.

With the influx of GG1's, the box-cab P5a's were systematically relegated to freight service, though the 28 streamlined P5a's still worked passenger trains for some time. Finally they too took to the box car brigade, and the GG1's became the road's standard electric passenger locomotives. From 1937 to 1943 new groups of GG1's were built until they numbered a total of 139 locomotives — all of which are still in service. These later GG1's were a bit heavier than the 4801-4857 group, and all had 100 mph gearing. The GG1's built after 1937 had cast steel pilots and drop couplers, differing from Nos. 4800-4857.

QUICKLY the remarkable capabilities of the GG1's became known and during the war years of excess traffic and lessened maintenance they performed superbly. One 90 mph geared locomotive, No. 4808, made a really spectacular run in 1944. Hauling the southbound *President* of 15 cars weighing 1150 tons, it left Trenton, N. J., 18 minutes late. No. 4808 rolled off the 27.9 miles from Trenton to North Philadelphia start-to-stop in 22½ minutes at an average speed of 78.4 mph. From 30th Street, Philadelphia, to Wilmington, Del., 25.7 miles were made in 22 minutes, averaging 70.1 mph. From Wilmington to passing Bayview, Md., 64.8 miles were covered in 50¼ minutes. Then — and in spite of the customary speed restriction on approaching Baltimore — 68.5 miles from Wilmington the time was only 57¼ minutes, giving an average speed of 71.8 mph. The 40.1 miles from Baltimore to Washington were made in 36½ minutes. A total of 128 miles for the entire run was thus covered at an average speed of 80.5 mph. Speediest running was from Odenton to Landover, Md., 15.2 miles at an average of 93.5 mph. Despite 3½ minutes lost at the



Baltimore stop, the *President* was just ½ minute late on arrival at Washington, D.C. With such a heavy train and long delays at Trenton and Baltimore, this run reflects credit on the engine crew and on the GG1. This sort of thing, however, was frequent in the war years when nonstop advance sections of the *Congressional* at times covered the 176.2 miles between Washington and Princeton Junction in as little time as 157¾ minutes. Once the 214.6 miles from Washington to Newark, N. J., were covered in a mite over 3 hours. This was accomplished with a trainload of over 1000 tons headed by a GG1 which had the handicap of some serious signal checks. Nonetheless, an average speed of 71.5 mph was made for the run. These runs were personally recorded by Everett L. Thompson.

I remember a drizzly night when GG1 No. 4848 was hauling 17 cars between New York and Broad Street, Philadelphia. At Rahway the speed was a bit over 90 mph, for we covered the 1.5 miles from North Rahway to Rahway, N. J., in a shade less than 60 seconds. Because of overlong stops at Newark and Trenton, we hit 90 mph several times to maintain our required high average running speed. We arrived on time at Philadelphia, and I recall that the length of the train forced us to walk through car after car to reach the platform at Broad Street.

Things like this had never happened before on the Pennsy with such passenger loads — or on any other roads using single-unit locomotives. Speeds well over 90 mph often were attained and held without difficulty. For a short time in 1937 it was permissible to run at 90 mph between North Philadelphia and Holmesburg Junction. Trains which arrived a bit late at North Philadelphia used to really pour it on over this 7.8-mile stretch in an effort to make up the time. I have seen GG1's and P5a's, both box-cab and streamlined, go over this section like a blur.

The same sort of running is being done today with passenger trains of 18 to 22 cars. I counted 24 cars on one occasion on a train which was right on time. A good number of Pennsy trains between the West and South are now made up of many head-end cars — such as baggage, mail, and refrigerator express. Sometimes as many as 8 to 12 such cars are in the consist, and coupled to them is the regular train made up of perhaps 12 or more cars. Formerly many of these head-end cars were run separately as solid express or mail trains. Now they are bunched together with the regular train, and the GG1 has to take the whole load singlehanded on a fast scheduled run.

The ruggedness of the GG1's has frequently been proved. Once No. 4840 crashed into a bulldozer at a road crossing at Stanton, Del., while making 80 mph. The bulldozer was thrown over the four tracks, but the GG1 suffered only a dented nose and a pair of derailed engine-truck wheels. Another sturdy member of the GG1 clan is No. 4876, which dropped into the cellar of the Washington terminal (see August 1953 TRAINS). It was quickly revived, and not long ago I had the pleasure of riding behind it out of Washington, D.C., hauling a 20-car train to Baltimore. No. 4876 swiftly brought us up to our 85 mph road speed and held it easily. Despite a station stop just short of the Baltimore station, we arrived on time. Clearly the patient had made a good recovery.

Through the years since their birth GG1's have made their scheduled runs amidst all kinds of winter weather without any marked effect on their operation. But in February 1958 wintry weather suddenly put most of them out of service. Exceptionally fine powdery snowflakes which formed only when the temperature was 12 degrees above zero or less accounted for this situation.

As was previously explained, air is used to cool the traction motors and other electrical equipment. This comes into the locomotive primarily through screened louvers before being forced by blowers into the air ducts which lead directly to the motors and other parts. The incoming air is filtered or screened by fine French linen, and the screens apparently did their job well since in the past few motors had shorted out during snowstorms. The P5a's which used the same snow protective arrangement were not disabled, but a close checkup showed that those powdery snowflakes were more inclined to form at certain levels above the rails. The closer the air intake louvers were to the rails, the more trouble these snowflakes gave. The louvers on a P5a are higher from the rail top than those on a GG1, which are under the hip on the right front and left rear hoods. Screens were in place on the GG1's and all should have been well, but minute invisible snow crystals nevertheless were penetrating the linen baffles. Upon melting, these created an almost gaseous vapor that shorted out the traction motors. Soon 134 of the GG1's were out of action. A Pennsy official who was

investigating the situation while riding the cab of a GG1 during this powdery snowfall·stood directly in front of the air-vent screens but he could see nothing coming in. When he moved away he noticed that his jacket was covered with a glaze of icy crystals.

Immediate steps were taken to correct this condition, and finally a disclike baffle was installed which diverted any snow intake. The winters of 1960 and 1961 were severe in regard to snowflakes and 12 above temperatures, yet no mass tie-up of GG1's took place.

While PRR sought this solution, diesels were borrowed from the Pennsy's western lines as well as from the southern railroads entering Washington, D.C. The diesels kept things moving well enough, although at times their train heating systems froze and caused delays. The winter was a wickedly wicked one. The P5a's, although they were geared for freight service and were without train-heating boilers, went to work hauling passenger trains again. In such cases, the GG1 was left on in order to supply heat from its boiler to the cars, and the P5a's hauled the dead GG1 and the train to its destination. This worked fairly well, for with diesel power, locomotives had to be changed near the site of the old Manhattan Transfer (N. J.) to allow electrics to haul the trains through the river tunnels in which diesel operation is prohibited.

Why the diesels (which also have their motors blower- or fan-cooled) were not likewise affected puzzled many. Two reasons appear tenable:

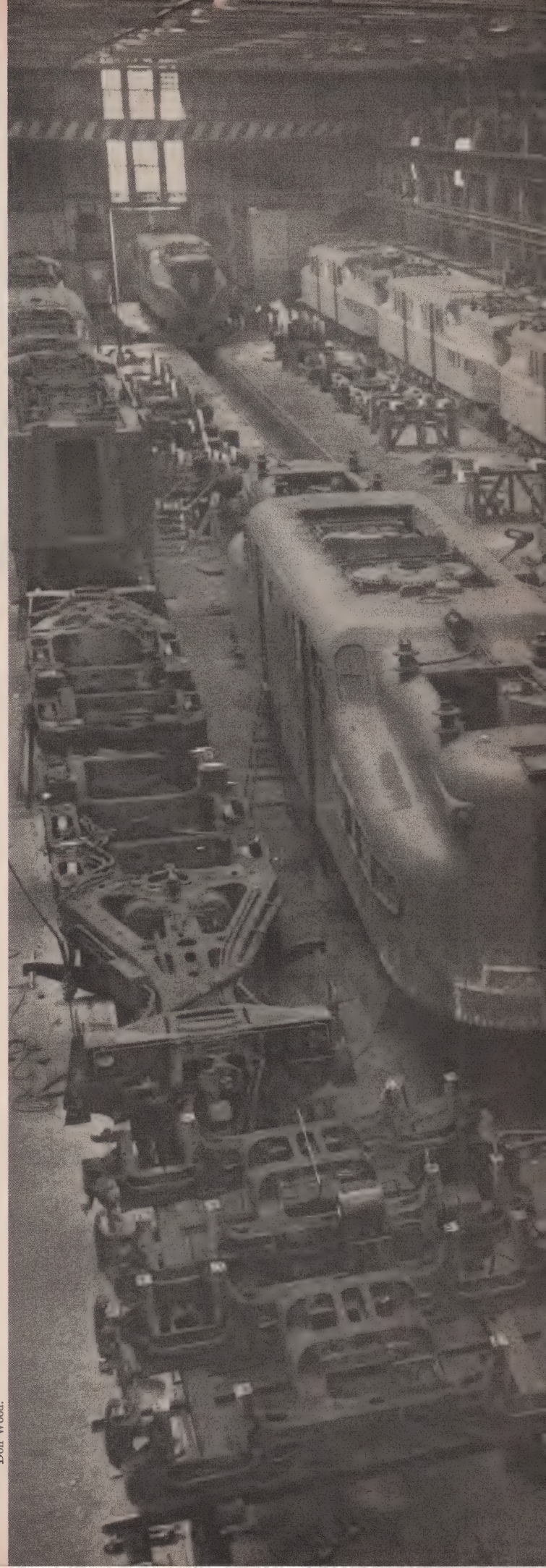
1. The louvers of the diesels are higher from the rails than those of either a P5a or a GG1, and the affinity of these particular snowflakes is for levels close to the rails.
2. The diesels used — and still do use — a centrifugal form of blower which prevented the entrance of snow, either solid or melted, into the air ducts.

Right now, these diesel locomotive blowers, or fans, are being used experimentally in a couple of GG1's. This together with the Pennsy's other approach to the problem, may well prevent mass disablement of the GG1's should there be a return of those 1958 snowflakes.

Later in 1958, in March to be exact, a heavier form of snow hit the Pennsy putting some catenary lines out of service. The snow was wetter and the temperatures during its fall were milder than during the February snow — well over 12 degrees above zero. Some trolley wires, overweighted with this sticky snow and buffeted by a high wind, did break. Diesel switchers were pressed into action to haul the M.U.'s and locomotive-pulled trains to live trolley sections where straight electric power could again take over. During this time, however, the air cooling apparatus of the GG1's did its job well.

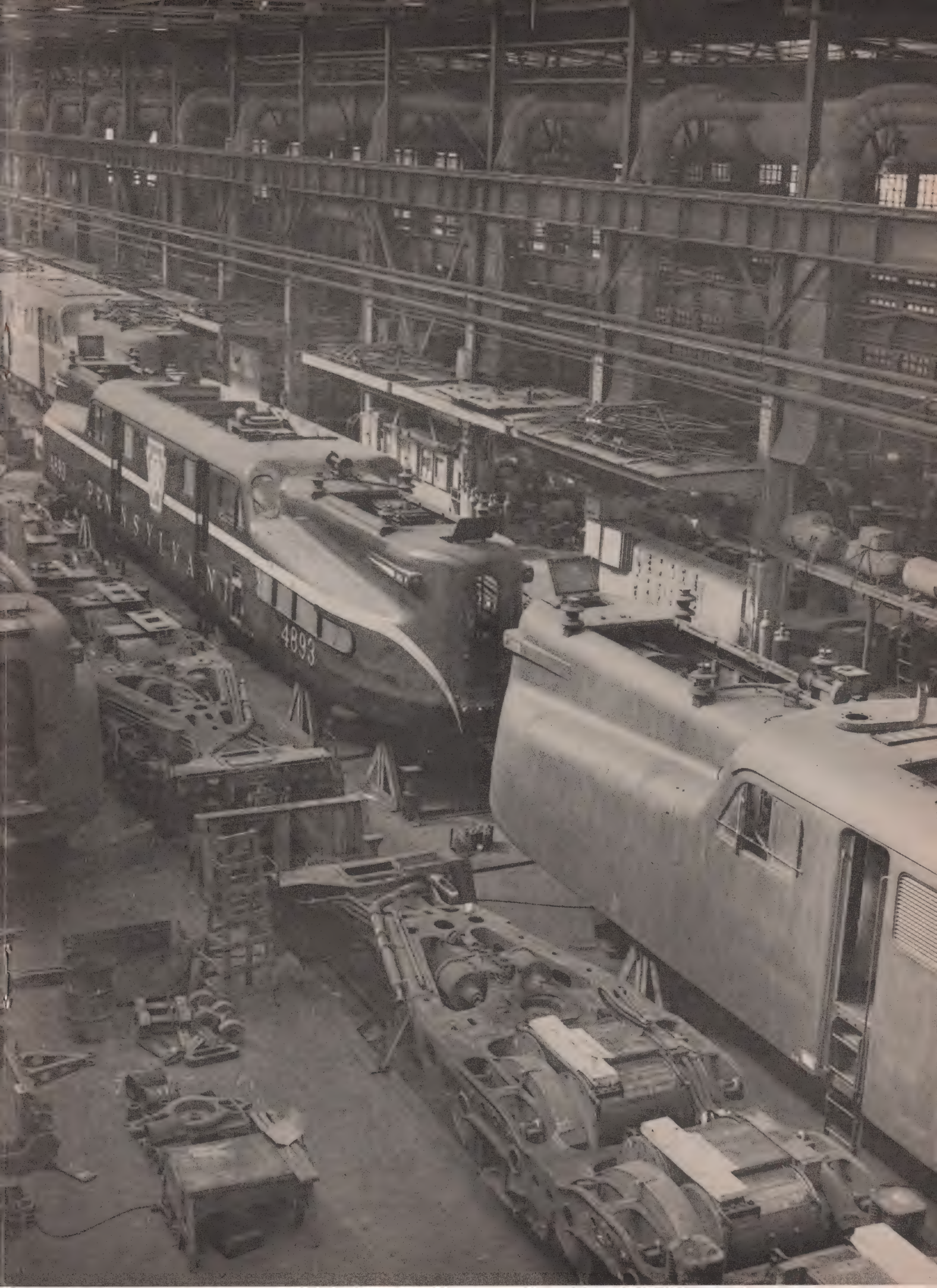
But time must march on, and good as the GG1's have been and still are, it is not likely that any more will be built. Decided advancement in railroad electrification and electric locomotives has been made since No. 4800 took to the rails. New frontiers have been opened to the railroads in this connection. Considering what the railways of Europe are doing, especially in France (electric locomotive speeds over 200 mph and ratings of 15,000 h.p. from a single-unit locomotive with two six-wheel trucks), the GG1 appears outmoded. The GG1's have features that are against them. With the later 100 mph GG1's carrying nearly 90 tons of dead weight — over 40 tons on each guiding truck — a clear handicap is placed on their shoulders. This means hauling the equivalent of about two extra cars on each train — thereby eating up a lot of kilowatts in a year's time.

Plainly, a locomotive with all axles motorized and with



Don Wood.

ON AND OFF their 2-C+C-2 frames, GG1's under repair fill the shop bay in Wilmington, Del., where Pennsylvania handles all major overhaul work on its electric locomotive roster.


PENNSYLVANIA
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all of its weight used for pulling has an advantage in some respects over one which lugs around 90 tons of dead, non-revenue but power-absorbing weight. However, there are two sides to the question. True, the locomotive with two six-wheel trucks has as much usable pulling weight as the GG1, and its drive has fewer parts. But the smaller 40- and 42-inch wheels, despite claims to the contrary, do wear out faster than the larger 57-inch driving wheels of a GG1. In the early days the 36-inch wheels on the road diesels wore out even faster, as was predicted. Remember, the small wheel (on the basis of r.p.m.'s alone) is working a lot harder than the larger wheel when both are motor-driven to produce power or work output because a force is being exerted on a motorized wheel and that means wear and tear for which the smaller wheel is less suited. But when used as idler wheels on guiding trucks and cars, a small wheel is a different matter. Those wheels don't give out with the "push-and-pull" — they just go along for the ride. Getting all the weight on the drivers is no guarantee of a super-performing locomotive in road service. Those deadweight trucks on a GG1 absorb power, but they also serve excellently in guiding the locomotive into and out of curves with superb smoothness and utmost safety at the highest speeds.

The excellence of that GG1 "cushioned" gear-and-quill drive is difficult to match — certainly not by the old nose-suspended gear-and-pinion drive that goes back 70 years to the earliest trolley-car days. Today's diesels and M.U. cars must use small trucks with this direct gear-and-pinion drive because there simply is not headroom for a better one. But in France, improvements have been made in this small-wheel-truck driving gear arrangement on some electric locomotives. One motor can drive two axles per truck and, as on the GG1, can eliminate the disadvantage of heavy unsprung weight. And gears can be shifted in a few minutes, making a passenger locomotive suitable for freight service and vice versa.

France and England seem to have settled the battle of the systems so long a deterrent to electrification in the United States. Alternating current at commercial frequency (50 cycles per second in France — "coffee pot" current, as the French call it) is used for transmission and distribution to the locomotive. For electrical power transmission A.C. has the edge over D.C., but rectifiers on the locomotive convert the trolley-fed A.C. into D.C. for the traction motors, thus allowing their excellent characteristics to be used for driving the locomotive. Seemingly this makes for an ideal situation, and despite present-day diesel dominance, future conditions on some American railroads might demand the best transportation tool to be had — the straight electric locomotive. If so, this A.C.-D.C. system of the French could fit into the picture.

In somewhat like manner, the new E44-class rectifier locomotives will run on the Pennsylvania. They will, however, like the GG1's, still used the costlier-produced low-frequency 25 cycles single-phase A.C. in the trolley. These E44's are said to be underrated and actually have developed a good bit more horsepower than their official 4400 figure. Recently two E44's took a 12,000-ton ore train from Philadelphia to Enola, Pa., opposite Harrisburg, in record time. This performance surpassed that of any other two-unit electrics or four-unit diesels on the same run with such a train. Of course, unlike the P5a's and GG1's, the E44's are built specifically for freight train operation and all their details contribute to that end.

Experiments with rectifier locomotives on the Pennsylvania took place long before the E44's. Around 1951 Westinghouse and Baldwin built four ignitron-rectifier locomotives for the Pennsy. Two were of the 0-6-6-0 type and two had an 0-4-4-4-0 wheel arrangement. Coupled in tandem, they rated around 6000 h.p. While they did some good work, their construction was more complex and costly than that of the straightforward E44's, and plainly they did not measure up to what the Pennsy wanted in an electric freight locomotive.

At the same time these Westinghouse rectifier locomotives were making their debut, two General Electric locomotives (two units per locomotive) which featured A.C. "from trolley to traction motors" came to the Pennsylvania. Each unit had an operating compartment at one end like a diesel "A" unit (as did the Westinghouse rectifier electrics), and coupled back-to-back they produced 5000 h.p. They also failed to hit the jackpot as the longed-for electric freight hauler that the PRR had in mind.

One of the sad things in American railroading was the fact that although Westinghouse's idea of ignitron-rectifier application to locomotives inspired the French to use this form of electrification, its further development here was discontinued. The French took it over and are reaping the reward for the possibilities they saw in it.

Dynamic brakes like those on diesels and on the E44's were used on both the Westinghouse and General Electric locomotives, but this form of braking had never been applied to classes L6 and P5a in freight service. Prior to 1951 the only Pennsylvania electric locomotive using traction motors to brake the train was the old FF1 — *Big Liz* — whose regenerated current was pumped back into the trolley wire instead of being dissipated.

STILL, nothing can detract from the fine work done by the GG1's in the past, the present, and — the Pennsylvania confidently anticipates — for possibly another 10 years. Today the GG1's are working harder than ever (they never have had it easy), but are standing up to it nobly. I recall one time when a big 18-car passenger train with a GG1 at the head end pulled into Harrisburg from New York on schedule. A short distance ahead on a side track waiting to haul this train westward was a three-unit diesel locomotive. Just as the GG1 was about to uncouple and move away, the engineer looked at me and with a note of supreme scorn in his voice said, "I don't know why they bother with those diesel things when they have a locomotive like this." A mighty good question — and a great tribute to a great locomotive. I

NEXT MONTH BERT PENNYPACKER CONTINUES OUR REPORT ON PENNSY POWER SINCE STEAM, WITH THE WHY AND WHEREFORE OF THE LARGEST DIESEL LOCOMOTIVE ROSTER IN THE LAND

MALLET REPLACEMENT: In the Washington backwoods, a Milwaukee Road cow-and-calf crosses the trestle of a branch line.

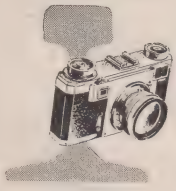


photo section

DR. HASTINGS GOES NORTH BY NORTHWEST

IF LONG-TERM TRAINS readers will require no introduction to the credit line of Philip R. Hastings, but for the illumination of newcomers to our ranks, let us say that soon after World War II this taciturn Vermont medical student took railroad photography by storm. Leaving the rods-down engine pose and the ¾-view action shot to the traditionalists, Hastings stressed instead what might be termed the total railroad scene. And quickly his work took hold — in TRAINS, *Railroad Magazine*, Beebe's books, everywhere. Today his duties as a psychiatrist in Waterloo, Ia., give him scant time to expose such films as these — all shot near Spokane back in 1950-1951.

WORKING round a horseshoe curve on her way up the eastern slope to the 4738-foot elevation of Lookout Pass is Northern Pacific Z-3 4021, a true compound of a 2-8-8-2 which required all of her tractive effort to move a dozen cars up the Coeur d'Alene branch. Impending Geeps made this a steam-in-twilight scene.

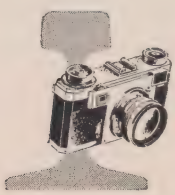


photo section

NEWEST and smallest of the Northwest transcontinentals, Milwaukee Road compensates for its age and size in Avery, Ida., by this display under Rocky Mountain Division catenary: S-1 4-8-4 250, a one-of-a-kind Baldwin built in 1930; and Hudson 131, whose job is forwarding the Columbian between here and Othello, Wash.

photo section

Rare bird in full flight

EVEN in Korean War days, when these photos were made, mainline Great Northern steam activity was almost nil; so imagine Phil Hastings' joy when he encountered dark-green Mountain 2524 banging off the miles with a way freight. He "hedge-hopped" with her near Sandpoint, Ida.

EXTRA 5406 WEST — four venerable Northern Pacific FT units bound for Spokane — is handsomely framed by a telephone pole, insulators, and wires as the diesels forward empty stock cars back to the ranchlands of the Pacific Northwest in a typically Hastings portrait.

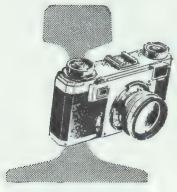


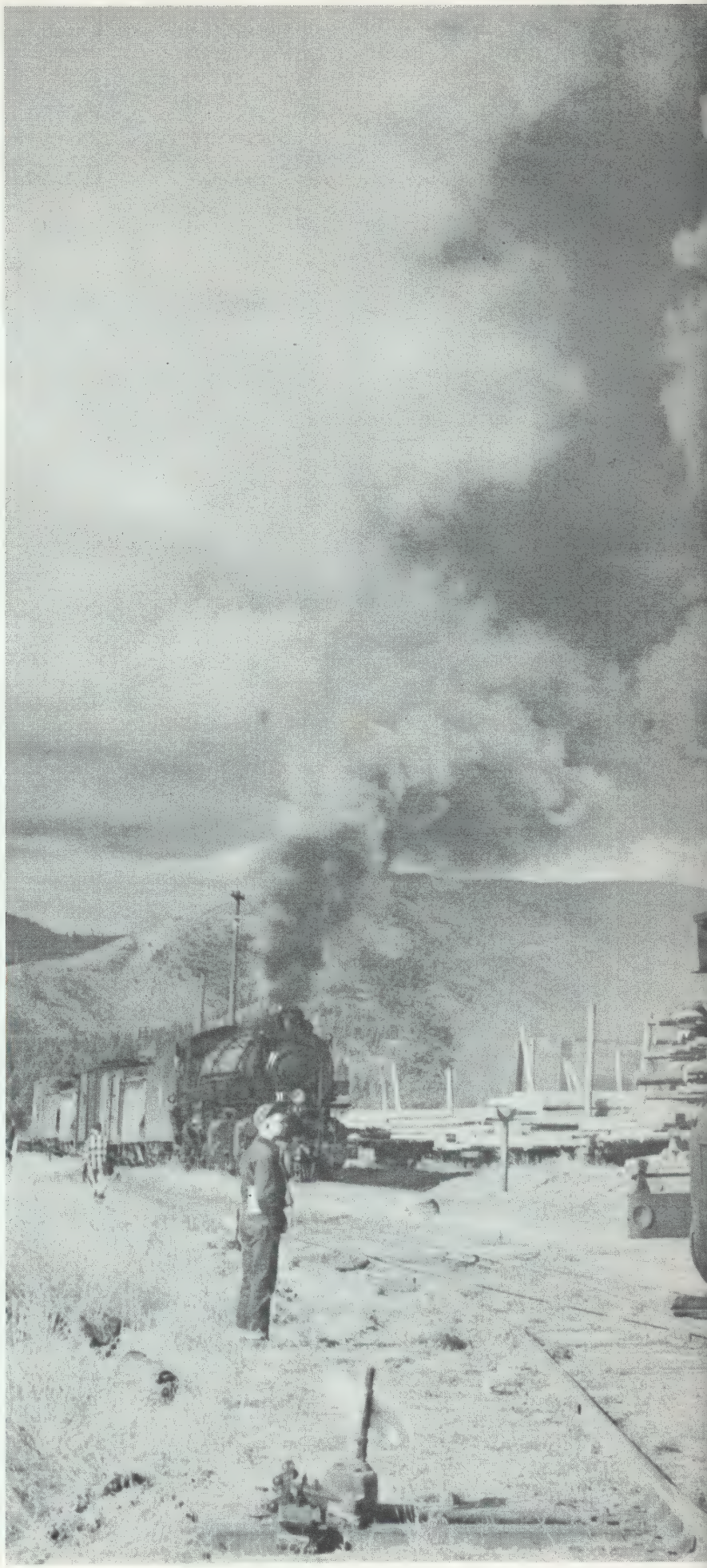
photo section

VILLAGE of Marshall, Wash., intrigued Hastings, for here he found three Class 1 mains curving upgrade side by side — plus trackage rights for a fourth road plus an interlocking plant plus helper wye, branch line, and interchange track. SP&S 4-6-6-4 910 charges upgrade with about 90 cars in tow.

photo section

Milwaukee's long-lived Mallets

WHEN electrification bumped 17 N-3 class compound 2-6-6-2's off the Coast and Rocky Mountain divisions, Milwaukee Road discovered that the Mallets could not handle an electric's tonnage over the 0.4 per cent intermediate Idaho Division. So Tacoma Shops simpled the N-3's and added superheaters, feedwater heaters, and 12-wheel tanks. With such a new lease on life, the articulateds endured until dieselization — as attest 58 (near camera) and 51 staging a meet at Newport, Wash., with freight trains 291 and 292.



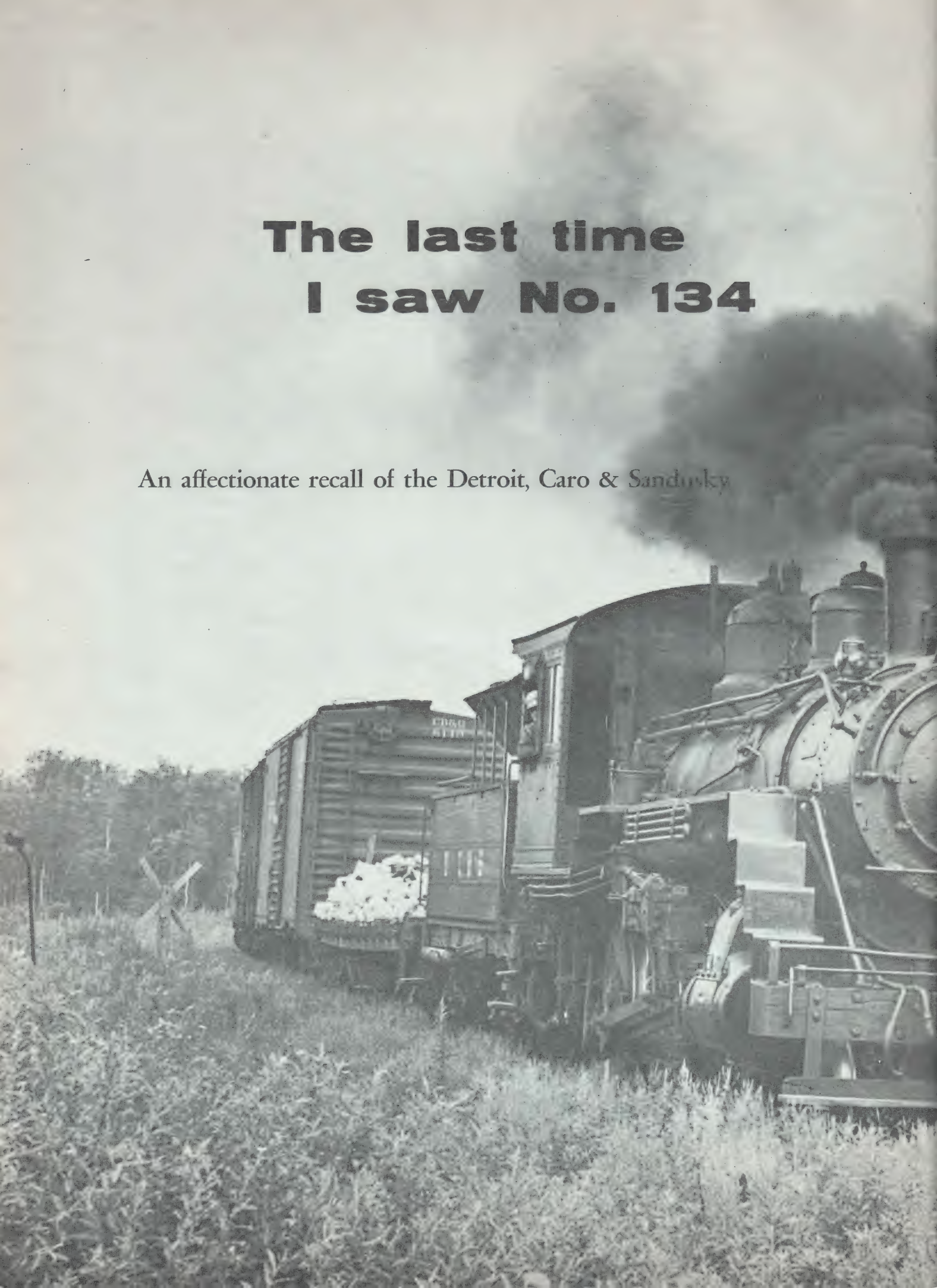
Bruce D. Fales.

That Dixie difference

AS a generality, one could state that in steam the East had standardization and the West had size but the South, which had neither, compensated for its lack in individuality. Dixie couldn't muster row upon row of look-alike Pacifics as the Pennsy did in West Philadelphia, and Cumberland grades were more likely entrusted to Mikes than to Mallets. True enough. Yet there was a style and a gentleness about the passage of a *Birmingham Special*, say, that was never experienced by *Century* patrons. Here's No. 29 on March 3, 1932, running 11 cars strong at 40 mph through Cameron Run, Va., down Southern Railway's double-tracked and knife-edge-ballasted Washington Division. Hooked up and firmly in charge is the 1388, the special pride of the Spencer (N. C.) roundhouse force. Obviously *someone* rejoices in this great green-and-gold Ps-4, for coal-burning locomotives are soon soiled by their own exhaust unless they are washed and polished daily. This — this was that Dixie difference. — D.P.M.

The last time I saw No. 134

An affectionate recall of the Detroit, Caro & Sandusky



NEAR Sandusky, eastbound 134 clatters over one of many road crossings between Caro and Sandusky on Michigan's "thumb."

H. D. RUNEY

photography / THE AUTHOR

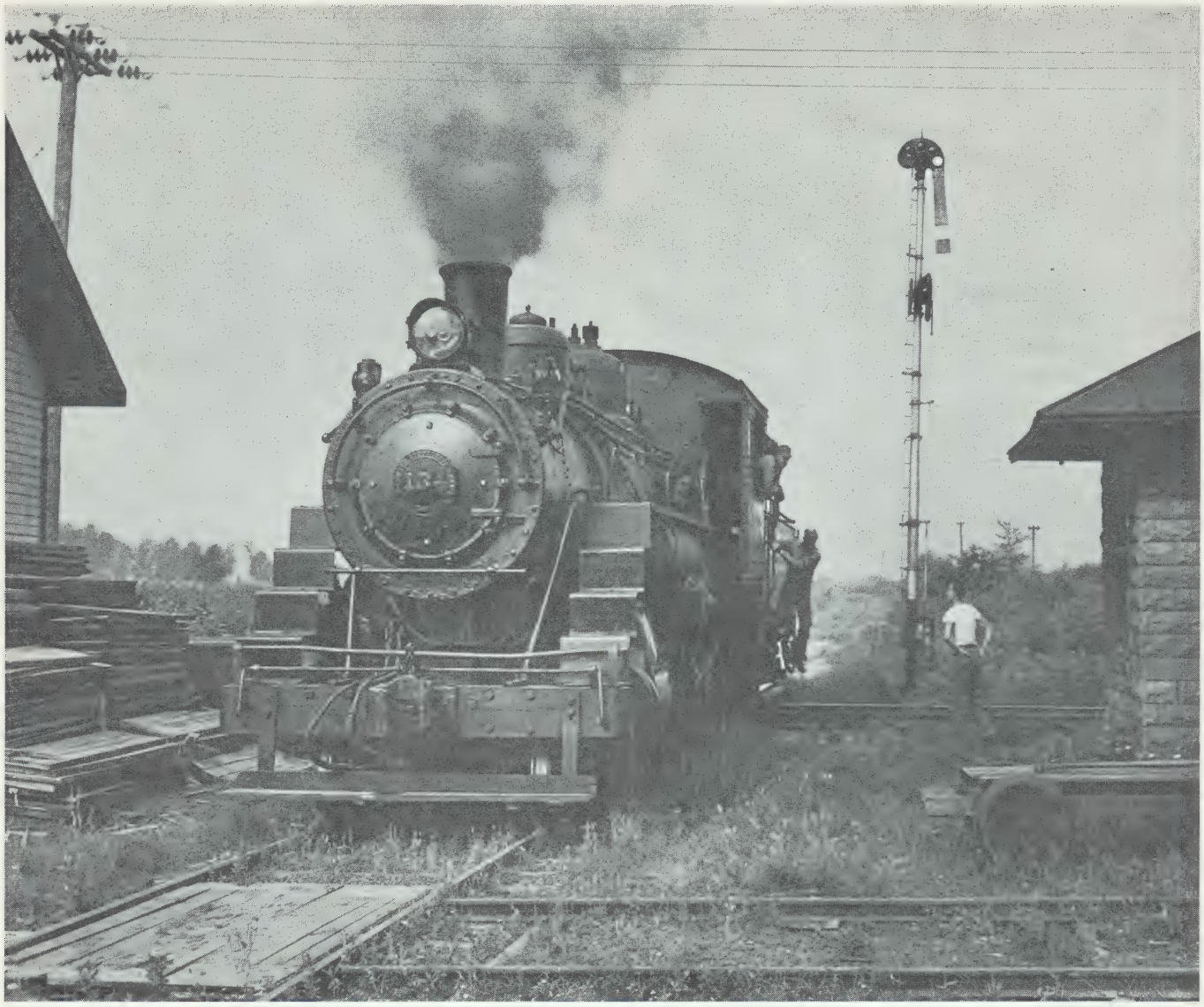
THE last time I saw her, Detroit, Caro & Sandusky No. 134 was simmering in quiet solitude under a blazing Michigan sun at Sandusky. Her crew was otherwise occupied in the performance of the various extracurricular duties that are the lot of those who work for short-line railroads.

The squat and unsophisticated Ten-Wheeler was a hand-me-down from the recently dieselized Detroit & Mackinac. She had small drivers and a highly individualistic tender whose shiny black paint couldn't quite hide the corporate name of her former owner. In spite of her esthetic shortcomings, she contrived to be quietly impressive as she patiently waited on the rusty siding.

Her headlight's somber gaze surveyed a dismal panorama of rotting ties and telegraph wires trailing forlornly from canted crossarms and broken insulators. Pilot, cylinders, and drive rods were almost lost to view, veiled by a growth of weeds and tall grass that engulfed the unkempt rails. Directly ahead, a row of gaunt telegraph poles stripped of crossarms and wire marched wearily across the flat grasslands where the right of way once had led to the hamlet of Peck. The rusty switchstands in the modest yards stood neglected and eyeless with black and gaping sockets where in better times red, green, and amber signals had glowed through burnished lenses.

The 134 had spent a good part of the day carefully negotiating the 30 miles of almost invisible track that connected Caro with Sandusky, and we had been her con-

TEN-WHEELER 134 cuts through weeds eastbound out of Caro, Mich., in 1949 — some four years before DC&S's abandonment.



AS operator and crew talk things over, 4-6-0 No. 134 (formerly of Detroit & Mackinac) crosses Grand Trunk Western at Wilmot, Mich.

stant and admiring companion since early in the morning, when Charlie Ferguson had eased his three-car train through the back yards of Caro and out into the open country. Charlie's poise and bearing made him seem like one who had handled a throttle since the days of the wood-burner. Such was not the case, however. A few years before we got acquainted with the DC&S and Charlie, and for reasons that don't come to mind at this writing, the road found itself without an engineer. A survey of the employees unearthed information that indicated without doubt that Charlie Ferguson was the logical man to ascend to the engineer's seat. His credentials for this position? Charlie had once operated steam threshing machines, a stroke of good fortune which resulted in his immediate transfer from section foreman to eagle eye on the three ancient DC&S locomotives.

We subsequently discovered that the line had come into being around 1925 with the dissolution of the Detroit, Bay City & Western, an enterprise which boasted four passenger trains daily between Port Huron and Bay City. The DC&S, we were informed, had never operated passenger trains at all, unlike most short lines of our acquaintance. Up until the summer of 1948 the fragile rails had extended beyond Sandusky to Peck. Currently, three connections were made with other railroads: at Caro, with the freight-only branch of the NYC (Michigan Central) running from Vassar to Bach; at Wilmot with the obscure Grand Trunk Western branch from Pontiac to Caseville over which a mixed train ran every other day; and at Sandusky with a C&O (Pere Marquette) freight-only branch operating out of Carsonville.

It was easy to see that neither the DC&S nor any of its branch-line connections were sufficient to produce much of anything in the way of traffic, and the little road reflected this unhappy circumstance. History, geography, and the passing of time had contrived to finally extinguish the aspirations and even the usefulness of the tracks which a new and different way of life no longer required. The weather-beaten semaphores at Wilmot where the DC&S crossed Grand Trunk rails at grade were operated only at rare intervals. They were positioned to protect the lone Grand Trunk mixed train from the infrequent meanderings of the DC&S power which two or three days a week steamed into view and whistled a clear track.

That's the way the DC&S was in 1949. It has been missing from the *Official Guide* for over a decade now, and the lonely semaphores at Wilmot crossing have probably been taken down. Sentiment surely has a place in this desperately urgent and forgetful world, and it's refreshing to think back to a pastoral rendezvous in the Michigan countryside with a three-car train and a gallant little Ten-Wheeler being patiently coaxed along an obscure single track by a onetime threshing machine engineer. I

SCHEDULE SEMANTICS

Remember what *, ■, †, ♮, and + or ‖ meant?

PHIL BORLESKE

I THE communication of ideas is an art at home on the railroads. Study a brochure distributed by one of the Western roads circa 1900 and you will find phraseology worthy of the Pulitzer in describing the glories of South Dakota farmland at $8 an acre. Thumb through the printed evidence which a railroad presents to the I.C.C. when it attempts to remove a passenger run or abandon a branch line. There you will find discourse that would convince the most informed armchair psychiatrist that the railroad is suffering from a persecution complex, since in return for the railroad's finest efforts only indifference and even antagonism flow from the public to the railroad.

As a method of communication the railroad timetable and the *Official Guide* contain many of the classic writings of the industry, particularly in the timetable reference note and explanatory note in the margin.

Although the most frequently found reference note is that of the flagstop — supplementing the regular stop — the timetable information which most aptly adds character to the business is found in other notations. A 1930 Michigan Central schedule, imitating a college textbook, offered a cross-reference to another note: "On Sundays makes 'b' stop." As recently as 1958 the Spokane, Portland & Seattle indicated that the *Western Star* stopped at one Washington community "to discharge U. S. Mail" only. Ten years ago the Atlantic Coast Line noted a "Mail stop, except Sunday. . . ." Almost as an afterthought, to that note was added the fact that the train would "also receive or discharge passengers." Few reference notes say anything about head-end traffic as those notes did. Nevertheless, Soo Line told the public in the 1930's that certain trains "will handle passengers when stop is made at coal shed at Lake Villa." If coal at Lake Villa was not one's fancy, one might have sought to board a 1922 Soo train at Eidsvold, where a particular local "will handle passengers . . . when stopping for cream shipments."

The Atlantic City Railroad (now integrated into Pennsylvania-Reading Seashore Lines) 30 years ago offered a stop "for seashore passengers," while the Rock Island at the same time stopped the *Golden State Limited* "when Pullman space is available." Seemingly unimpressed by the almighty dollar, Union Pacific conditionally stopped in 1932 at one point "for nonrevenue passengers." A year later, attracted by numbers, Delaware & Hudson specified in a footnote, "Stops to leave four or more passengers." Simultaneously, the Wabash, not often thought of as a commuter road, submitted a note regarding "revenue suburban passengers," while the Susquehanna, definitely host to an extensive commuter service in the past, said until late 1958, "Stop for this train . . . conditional upon its capacity to accept additional passengers." Boston & Maine optimistically spoke in the 1930's of one of its Medford branch commuter runs as the "workingmen's train" — when many Bostonians were not, in fact, working. Maybe B&M felt it was providing a significant public service by identifying the train specifically for commuters and not for shoppers, or perhaps it meant to practice segregation of the sexes — only men work and therefore have the privilege of riding that train! To assist the little folks of Neptune, W. Va., B&O noted a stop "on school days only to let off school children" returning home to their mommies and daddies. This reference appeared in timetables for many years up to the mid-1950's. As explained in a 1933 Missouri Pacific timetable, St. Louis Southwestern trains riding Mop rails out of St. Louis, out of respect for the law, stopped at Menard, Ill., "for Sheriffs to get on or off." The Espee still adventurously quotes schedule times prefixed by a note reading, "Does not stop."

Then there is the subject of passenger connections as recorded in these 1930 excerpts. Pennsy, for example, stopped its *Spirit of St. Louis* at Port Columbus (Columbus [O.] airfield) "to receive rail-air passengers," indicating the special emphasis which the "Standard Railroad of the World" placed on the then-budding transcontinental air service. On the other hand, the Pennsylvania Railroad was not so endowed with the spirit for holding trains, for it asserted that its "train from Pittsburgh will not be held if connection from west is late." Inde-

cisively, Chicago & North Western restrained its *Duluth-Superior Limited* "a reasonable time for connection with DM&N Ry. No. 6."

The influence of water transportation upon at least a few railroads is apparent. Beaming with literary genius is a 1930 Southern Pacific footnote, "Tickets are not sold beyond Atchafalaya River, as Southern Pacific operates no service across river; there is a private ferry service on which passengers may make own arrangements to cross." With its last days of passenger service dependent on a ferry connection across Chesapeake Bay, Baltimore & Eastern affirmed the connection "weather and tide permitting." An L&N table more than a quarter-century ago called attention to stops made "on request of Tennessee River Packet Co." The Dominion Atlantic formerly ran trains to and from Yarmouth (N.S.) wharf "on boat days only." In a 1904 timetable, the Copper Range Railroad, instead of "discharging" or "leaving" passengers, preferred to "land" them, just as Pere Marquette did in reference notes before its union with C&O. Of course, it is reasonable that Pere Marquette would use the nautical term "land," for several Lake Michigan carferry routes were included within its transportation network. Union Pacific, which originally operated several of its transcontinental streamliner *City* trains on the basis of certain days of the month — all are now daily trains — called attention to the "sailing dates" of those trains.

In conjunction with the military, Canadian Pacific's *Canadian* has, within the past few years, stopped on signal at one Ontario military camp "for military personnel." With its Glenview (Ill.) station adjacent to a strategic military airfield, Milwaukee Road stopped its *Varsity* as part of the World War II effort "only to leave military personnel in uniform."

FOR delight in reading a railroad timetable, one must respect some of the precious elements which guide the railroad industry in the course of serving the public. One would have to have some knowledge of Baltimore & Ohio history to appreciate a 1930 entry: "Stops to discharge passengers from stations on the Old Main Line." When the Milwaukee offered this note 10 years ago, "Stops on signal to pick up revenue passengers from Madison Division Second District No. 26," you were expected to understand the divisional structure of that 11,000-mile system. Several railroads have called attention to stops made at various railroad crossings. These notes, circa 1930-1940, are representative: Burlington acknowledged in one case, "Stop is made at crossing"; a former CMStP&P train stopped "at Frisco Crossing"; and the Soo Line said that it would "take on or let off passengers when making railroad crossing stop." Even today, C&NW's *Rochester 400* "stops at CGW crossing in Dodge Center (4/10 mile east of C&NW station)."

Lake Shore Electric passengers needed at least nominal railroad knowledge to catch the 5:25 a.m. local of the early 1930's to Toledo, since it "departs Sandusky Wye." Meanwhile, Espee's *Mail* to San Francisco departed from Sparks' "Dispatchers office," according to a 1940 *Official Guide* remark.

The Pennsylvania noted in mid-1940 timetables that only the "first section" of the *American* stopped at particular stations. Fifteen years earlier C&NW outlined in reference notes stops for the first and second sections of its *Victory*. Quoting a CMStP&P system folder of the 1940's, the *Olympian* "coach section stops on signal."

RAILROADS and the scenic West have been inalienable partners in the past, as a quick survey of timetable notations will show. Canadian National offered this note less than a decade ago: "Mount Robson — the *Continental Limited* stops for 5 minutes to afford passengers a leisurely view of magnificent Mount Robson, highest peak in the Canadian Rockies, 12,972 feet." Speaking on behalf of UP-SP's Overland Route, but a bit more conservative in its definition of Western scenery, the UP in 1925 simply stated, "Stops for view of American River Canyon." One might suppose that Mount Robson or the American River Canyon was worthy of much more leisurely observation than Oregon's beautiful waterfalls, for an entry during the depression and into the 1940's noted that a UP train "slows down to give passengers view of Multnomah Falls." The Union Pacific again, proud of its lofty vistas and placid mountain lakes, listed in the footnote column of a 1932 timetable a tour for every traveler who might hope to see all that the Pacific Northwest has to offer. Puget Sound? No. Mount Rainier? Wrong again. Instead, "visitors at the Longview Lumber Mills escorted by capable guides may view in safety all operations of the mammoth plant from overhead passageways."

Not to underestimate the eastern United States and Canada, Michigan Central stopped in the 1930's "3 to 5 minutes at Falls View to allow passengers to view Niagara Falls."

FREQUENCIES of train operations add their offbeat revelations to our review. In a 1954 Canadian Pacific timetable we notice, "Ski train operation is contingent upon snow conditions and subject to cancellation." A Pennsylvania-Reading Seashore timetable issued in the 1940's carried this paragraph in the margin: "Fishermen's Special: This train is operated for the Cape May Party Boat Association and is subject to cancellation the night before departure if weather conditions at Cape May are unfavorable. Cancellation announcement will be made by radio the night before departure." Not to be outdone, New Haven said in the 1930's concerning one passenger run, "Tuesday, Wednesday, Thursday, and Friday only, during session of Connecticut Legislature." In the same era the Missabe Road offered the customer something less — a branch line mixed running "every second Thursday only." Canadian Pacific had a similar note in the 1950's, whereby a certain mixed "operates the Saturday following the second Friday of each month."

Recovered from a 1933 Milwaukee Road timetable is this reference, "When there is business, these trains will operate through to Empire." Apparently Empire wasn't very busy, for the mixed train and its branch line were removed months after this entry first appeared. Yet, the Milwaukee didn't give up easily, for this reference note remained in the timetable a brief period after the line was abandoned.

Talking about mixed trains, out in Nebraska cattle country CB&Q cautioned mixed train passengers three decades ago that trains were "subject to delay to pick up livestock." Union Pacific prefers to be more specific, for its timetable continues to speak of the Albion (Nebr.) mixed: "On days livestock is carried, train 82 runs about one-half hour later than schedule shown." World War II saw Lehigh Valley calmly write off at least one mixed train as "subject to delay," just as in 1930 Toledo, Peoria & Western admitted "passenger connections uncertain." Not having a mixed or passenger train available for every line in 1940, Canadian National as a genial host said, "Passengers will be carried on freight trains; freight train permits not necessary."

AFTER looking over a heap of old timecards and brittle *Guides*, we can see why the railroad industry breathes warmth and character for the man who loves railroad life. While this review is in no way exhaustive of the supply of notable footnotes, it shows in part why the railfan can march a mile through a blizzard to watch the wedge plow clear out the branch line but becomes absolutely immobile when he's supposed to shovel off the household walk. And it helps to explain why the rail enthusiast reads himself to sleep with a 1929 *Official Guide* instead of the Book of the Month. I

One afternoon in Austria

An encounter with a 4-8-0

DAVID P. MORGAN

photography / DAVID W. BEADLE

I AS a boy I had access to enough copies of *Railway Wonders of the World* to form the opinion that the European steam locomotive, seldom a handsome animal at best, declined steadily in esthetic appeal as one moved eastward from France. Or southward, for that matter. The engines whose pictures I pored over were in some instances so grotesque as to be stimulating — just as a sternwheel packet, the antithesis of a ship, nevertheless may possess a certain majesty.

My opportunity to ride behind and to inspect a genuine European locomotive arose July 5, 1961, in Austria. I took an afternoon off from witnessing the trials over Semmering Pass of German diesel-hydraulics destined for the U. S. [October 1961 TRAINS] and rode a couple of steam trains between Murzzuschlag and Bruck an der Mur, a 26-mile run down the Murz River. The ride down the gently landscaped valley (in a brace of 4-wheel cars behind a 4-6-4T) was pleasant if unexciting, the weather was mild, the goal provocative. For in the junction town of Bruck I hoped to board No. 580, a Rome-Vienna express, for the ride back to Murzzuschlag. And "express" meant the high-mounted oddity of a 4-8-0 which you see in these photos. In she rolled, the 33.115, limping from an apparent hot axle bearing, towing 17 cars, steaming straight out of the pages of *Railway Wonders*.

How European can an engine be? The 33-class 4-8-0 (the word Twelve-Wheeler seemed too American to describe her) bore the thin stack that denotes a Giesl ejector; Germanic but split smoke deflectors; a cab with more size than protection; Walschaerts gear actuated by O. C. Lentz valves; a bland smokebox door; and a grubby, overworked fireman. She rode on 66.9-inch drivers, dated back to the '20's, and had worked the Semmering until electrification. I'm hopelessly partial to big power (aside from a few 2-8-4's, nothing bigger than the 33's was ever built by Austrian Federal for passenger service) and unusual wheel arrangements (the only other 4-8-0's I had seen belonged to the Espee), so the 33.115 enchanted me in spite of her gracelessness and grime.

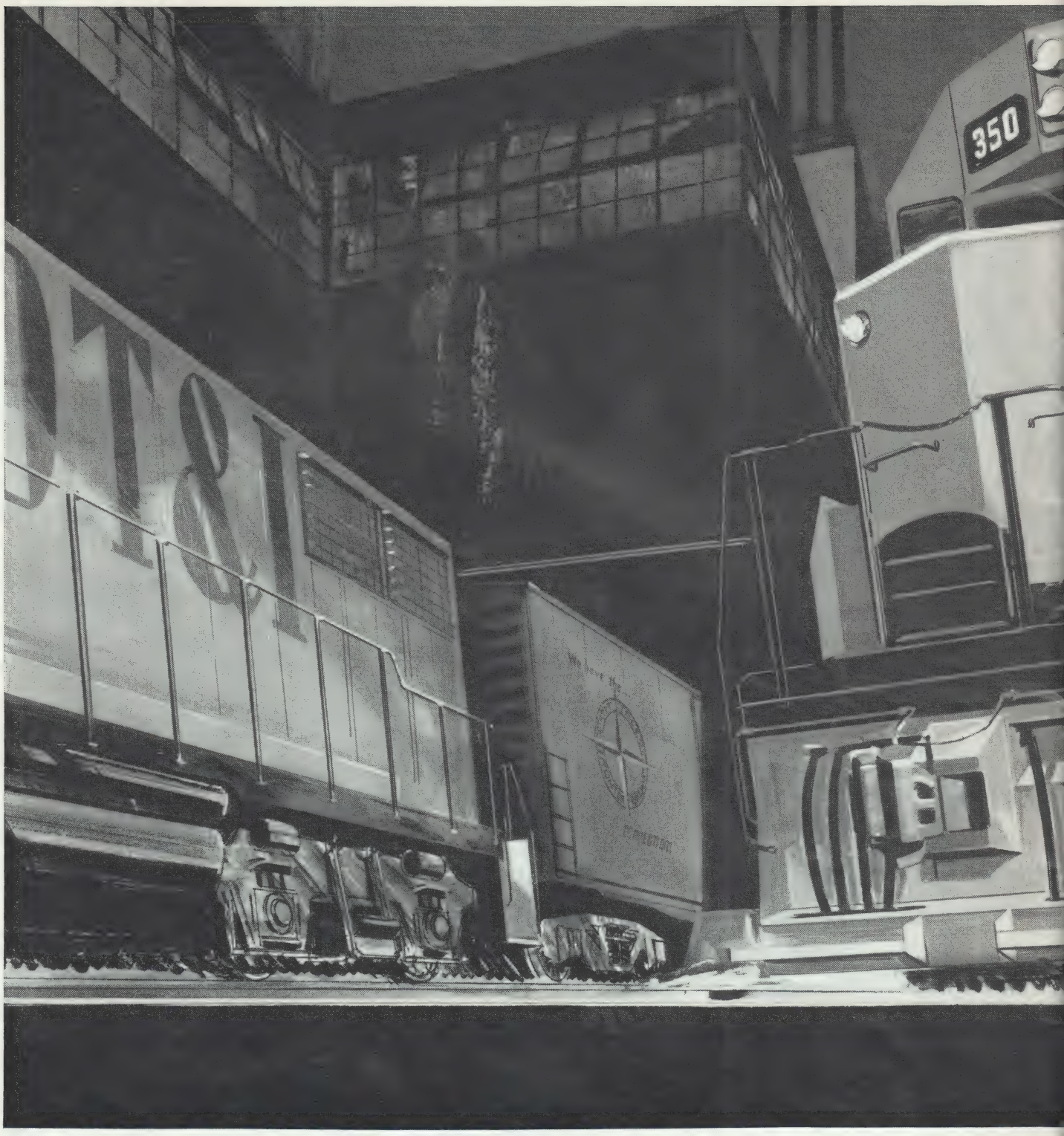
The journey back to Murzzuschlag along the Murz was uneventful. Despite an assist from a 4-6-2T, the 33.115 only managed the 26 miles in 41½ minutes. Yet the sight of that lazy tandem leaning into it on the curves on a July afternoon in Austria is one that rests comfortably in the memory. I think it always will. I

Low-nose lookout

STARTLING . . . and ugly: those were perhaps the commonest thoughts among train-watchers when Santa Fe led the industry in the adoption of low-nose short ends for hood units. The basic aim was 180-degree visibility for the engineer, of course; and external esthetics aside, no one

Ed Wojtas.

could complain about the change. See here as Rock Island Engineer Phil Reynolds notches out GE-built U25B unit No. 204, first of three such 2500 h.p. units rolling fast freight No. 81 west on double track between Davenport and West Liberty, Ia. Is this not the ultimate contrast in cabs between the thumping seatbox hung on the backhead of, say, a 5000-series 4-8-4 and the cockpit of a U25B, with its speedometer, radiophone, windshield wipers and visors, full-view lookout, and short-sleeved engineer? Wouldn't Bob Butterfield be surprised! — D.P.M.



GP-35s bring new broad range capability to Detroit, Toledo, and Ironton's fleet

Eight new GP-35 Diesel locomotives, with 20,000 combined horsepower, are bringing new broad range capability to the motive power fleet of the Detroit, Toledo, and Ironton Railroad Company. The new GM units, part of the DTI's continuing modernization program, can work in consist with lower horsepower units without sacrificing high-speed or heavy tonnage efficiency. This means the DTI can put the new locomotives to work with older units to speed up schedules or to carry heavier payloads, at an operational savings. New GM power and the DTI are teamed up for railroad progress.

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS • LA GRANGE, ILLINOIS

HOME OF THE DIESEL LOCOMOTIVE • **In Canada:** General Motors Diesel Limited, London, Ontario

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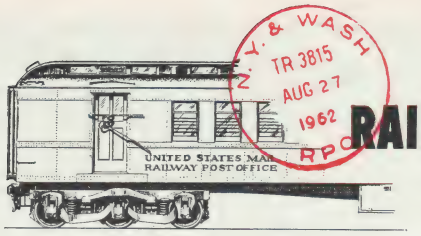


RAILWAY POST OFFICE

edited / ROSEMARY ENTRINGER

Check your collections

Any information your readers can furnish as to the whereabouts of turn-of-the-century railroad negatives made by the late Allen Green of Oakville, Ia., will be greatly appreciated.

These glass plate negatives were in 11 x 14-inch, 8 x 10-inch, and 5 x 7-inch sizes. His most famous photos were made in 1899 of such crack Burlington trains as the *Fast Mail* and *Denver Flyer* at speed. Green apparently invented an "electro-mechanical device" by which the locomotive tripped the camera shutter. The resulting picture taken at 1/1000th of a second literally froze all motion of the train rushing by at 80 mph.

Some of his pictures were taken inside trains, using flash powder. One of a series made aboard Burlington's *Fast Mail* accompanies this letter.

Of some 75 of Green's railroad pictures, the whereabouts of fewer than 20 negatives are known to us. We would like to know if any collector has the remainder, so that we might arrange to obtain prints for use in illustrating historical publications.

While Allen Green's photos are outstanding, it may be that other pre-1900 Burlington photos exist. If so, we would very much like to learn about them.

A. M. Rung.

Director of Public Relations, Chicago, Burlington & Quincy Railroad, 547 W. Jackson Blvd., Chicago 6, Ill.

Allen Green.

FLASH POWDER illuminated this turn-of-the-century scene on Burlington's Fast Mail.

Off the track on switchbacks

The author of the very interesting article "Saved: Switchbacks and Shays" in January TRAINS states that the Cass Scenic Railroad is operating the last two switchbacks in the United States. This is definitely not so. In northern California, near Mt. Shasta, the McCloud River Railroad is using a switchback in daily operations between the town of Mt. Shasta and McCloud. The line is using diesels now, but it also has a 2-6-2 in standby which is being used once or twice a year for railfan excursions over the same tracks (see "Steam New Photos," page 10, December 1963 TRAINS).

Henry W. Brueckman.

P. O. Box 713, Lodi, Calif.

. . . I very much enjoyed the article on the Cass Scenic Railroad . . . but I feel that one statement made by Mr. Killoran should be corrected. The Montpelier & Barre Railroad in Vermont has two switchbacks on its 14-mile line up to the Barre granite quarries.

Herbert G. Ogden Jr.

R.F.D. 1, Box 119, Windsor, Vt. 05089.

. . . The Baltimore & Ohio has two [switchbacks] that I know of. One is at Foxburg, Venango County, Pa., and the other is at Cleveland, O. The Cleveland switchback gives the B&O access to Cleveland Union Terminal and is visible from the C&O locomotive on display in a park near the Cleveland Zoo. It has one reversal, I think. The Foxburg switchback has two reversals.

At the base of the Foxburg switchback is an interesting structure. The railroad crosses the Allegheny River on a deck truss bridge. This truss also serves as a through truss highway bridge. At the ends of the truss superstructure the highway makes sharp turns and the railroad continues on deck plate girders. As a result the highway bridge and the railroad bridge share the same truss superstructure and the same piers, but have different abutments.

Getting back to switchbacks, I think you will probably find some in open pit mines and you could possibly consider the car-return arrangement at most rotary car dumpers as a switchback.

John D. Weinhold.

1121 Elk St., Franklin, Pa. 16323.

. . . "Saved: Switchbacks and Shays" contains two untrue statements: 4842-foot Bald Knob Peak is the highest spot reached by a non-cog railroad east of the Rocky Mountains; and the line's two remaining switchbacks are the last in the U. S.

When our club, the Iowa Chapter of the National Railway Historical Society, ran the *Intermountain Limited* on the Burlington's Black Hills Branch last August we ran over six summits having these elevations: 4843 feet, 4958 feet, 5509 feet, 5858 feet, 5640 feet, and 6214 feet. All of these points on the line are higher than Bald Knob Peak. Geographically the Black Hills of South Dakota are 300 miles east of the Rocky Mountains.

When the Denver & Rio Grande Western standard-gauged its Monarch Branch, it retained the two switchbacks. Thus the daily freight to the Colorado Fuel & Iron limestone mine at Monarch, Colo., still uses switchbacks to gain altitude.

Edward P. Wilkomen.

2539 N. 72nd St., Wauwatosa, Wis.

. . . I liked the article on switchbacks and Shays. I wish you had included a timetable or information on when it runs.

R. D. Christel.

1017 Cameron Ave., Dallas 23, Tex.

¶Cass Scenic Railroad at Cass, W. Va., expects to begin operation of the 1964 season on May 15 and will run three trips a day at 11 a.m., 1 p.m., and 3 p.m. on Saturdays and Sundays until June 15. Three trips will be operated daily at these same times from June 15 through October, and parties may arrange special excursions. Fares are $2 for adults and $1 for children under 12 years of age. The round trip takes approximately 2 hours. — R.E.

Snow scene

When I slipped my January TRAINS Magazine out of its envelope I almost jumped aside to clear the track for that *Zephyr* bearing down on me.

Randall E. Carney.

1421 McDowell Rd., Jackson, Miss. 39204.

. . . I would appreciate it very much if you could clear up the matter of where the picture on the January 1964 issue of TRAINS was taken.

I have reason to believe that it was taken sometime in 1937 or the winter of 1936 on the Burlington at Lee, Ill. In a special issue on American railroads in the *National Geographic Magazine* in 1937 there is a similar picture credited as having been taken in Lee, Ill.

I lived in Lee from 1933 to 1956 and my father had his store across the street from this very spot. Men were hired by the Burlington to shovel snow on the track for the shot of the *Morning Zephyr* plowing through the snow.

Henry S. Paulsen.

1838 Siefert Dr., Poplar Bluff, Mo. 63901.

¶The Burlington confirms the location and time as Lee, Ill., 1937. — R.E.

Passenger income sans passengers?

In looking over the third quarter statistics in *Modern Railroads* recently I noticed passenger revenues for Class 1 railroads as follows:

Elgin, Joliet & Eastern	$ 16
Clinchfield	118
Tennessee Central	3666
Quanah, Acme & Pacific	3
Cotton Belt	908
Toledo, Peoria & Western	121

What gives? I presume that the receipts are from mixed trains operated, although none of the above roads mentions a word in the *Official Guide* about hauling passengers. The one that puzzles me in particular is the EJ&E. I can understand the other lines serving the backwoods areas and occasionally finding someone wanting to ride, but the area served by the EJ&E is covered by better transportation. Could the above revenues be for a switching move or something like that?

Simon E. Herring.

932 N. Main St., Bellefontaine, O.

¶We know at least where Tennessee Central received its passenger income for the third quarter of 1963. A photo on page 15 of February TRAINS shows now-freight-only TC hauling a shrine extra on a Nashville-Cookeville (Tenn.) round trip. Revenues for the other entries were likely accrued by similar extracurricular excursions, or by troop trains, or — in the case of the small amounts — by abiding by the I.C.C. regulation which requires all nonrailroad people to pay for their passage, even when riding locomotives or cabooses. Anyone have further information? — D.P.M.

Reminiscence

While going through my January issue of TRAINS earlier this evening, I was interested to note amongst your "Railroad News Photos" [page 9] the shot of Pennsy's converted Budd car — sleeper to coach.

This particular car, *Beaver Falls Inn*, has — or should I say had — the distinction of being the first sleeper I used on the American railroads en route from South Africa to Seattle in 1949. It was also my initial experience with roomette space in a Pullman. The train was Pennsy's *Golden Triangle* from Pittsburgh to Chicago in mid-April of 1949. My nostalgia also vividly recalls awakening the next morning somewhere east of Gary, Ind., to the thunder of a Nickel Plate Berkshire keeping pace with us on a parallel track at the head end of a fast freight. Alas . . . no more such pleasures from a roomette window of the *Beaver Falls Inn.*

Roger M. Perry.

227 Grant St., Park Forest, Ill.

Cowcatcher memories

In reference to the items entitled "Hobo Recollections" in the January "Railway Post Office," for more on cowcatcher riding I refer readers Mayo and Lester to *A Treasury of Railroad Folklore* by Botkin and Harlow (pages 229 and 230) for a little less enthusiastic account by Frisco, the Tramp Royal.

Richard N. Mansley.

7722 Loretto Ave., Philadelphia, Pa. 19111.

. . . I enjoyed the account in "Railway Post Office" of the ride taken by the Asbury College students on the front of the engine of local train No. 16 (*not* 101, which was the *Royal Palm De Luxe* in the late 1920's) in the late '30's. The 6482 was breaking in on the local, after Ferguson shopping, preparatory to returning to its regular assignment on 3 and 4.

Flem Daniel Smith.

P. O. Box 551, Georgetown Ky. 40324.

. . . The letters from cowcatcher hoboes in your December issue brought forth recollections of several experiences I had during two years I spent in Mexico. During that time I rode the cowcatcher on at least three different occasions I can remember — twice on rainy nights to help the engine crew sprinkle sand on the rails when the sander failed on 3 and 4 per cent grades.

The most memorable time didn't result from rain or a grade though — it occurred on the hot, dry flats of Yucatan as a result of a leaky spark arrester. In the closing days of 1959 the United Railways of Yucatan still operated a woodburner (4-6-0 No. 47, then the last woodburner in Mexico) on its isolated Dzitas-Valladolid branch. After arriving in Dzitas from Merida aboard No. 31 I made my acquaintance with the 47 — which was the first and only woodburner I have ever seen in passenger service. Her elderly hogger, flattered by my attentions, invited me to ride with him, and I lost little time in accepting.

It was a thrilling ride, and I was fascinated watching the young fireboy heave those logs through the tiny firebox door, never missing once — an art which is surely lost elsewhere. But riding in the cab of the old 47 had its disadvantages too. For despite the great balloon stack, the spark arrester was in poor shape and great hunks of flowing charcoal came sweeping back into the cab through the open door, making it risky to open one's eyes wider than a tiny slit.

After two or three station stops, the brakeman appeared with a gunny sack which he laid across the front pilot, above the cowcatcher. Then both he and the hogger climbed on to enjoy a fresh breeze free of glowing ashes. No. 47, bell ringing, accelerated out of town under the young tallowpot's eager guidance, the passengers in the wooden coach behind being none the wiser. I caught the grab-irons as the cab went by and occupied the fireman's seat until the next station. Then, after ascertaining that the gunny sack and pilot were wide enough for three, I joined the engineer and brakeman.

The ride that followed was wild. Our feet were only inches above the rail, since the 47 was a small engine. The alignment of the rails did not look very promising from that angle, and at every wide place I braced myself, expecting us to fall between them. But the youth at the throttle rolled her confidently through the forest at what seemed breakneck speed, and we stayed on top.

Leaning over, I asked the gentleman next to me how fast we were going. "*Uno*," was his taciturn reply. I pondered this, got nowhere, then sheepishly asked, "One what?"

"*Un kilometro por minuto*," he replied calmly.

"Oh." One kilometer per minute — that figures out to about 35 mph. Not very fast in the U.S.A. in the 1950's. But I understood how the pioneers of railroading felt when they first achieved such a daring speed over 100 years ago — for riding a 3-foot woodburner only inches above weaving 30 or 40 lb. rail, it felt just about the same, even in 1959!

Frank Barry.

P. O. Box 474, Chama, N. Mex.

Exception to definition

I am writing this letter to take exception to the EMD definition of normal aspiration contained in your answer to Allan Sherry's letter printed in the January "Railway Post Office" [page 52]. In addition, I would like to correct the impression you leave that the term is one devised by EMD.

During my engineering education, the

term "normal aspiration" was defined as the air intake of a non-supercharged diesel engine. Since EMD non-turbocharged locomotive diesel engines are equipped with a supercharger — the Roots Blower (a mechanically driven, positive displacement air pump) — these engines cannot be defined as normally aspirated. In addition, the term normal aspiration was used by Baldwin, after its introduction of a supercharged engine, in its literature and in the *Locomotive Cyclopedias* of the period to describe the Baldwin non-supercharged six- and eight-cylinder in-line engines. Therefore, the term was not devised by EMD for application to a diesel engine for locomotive use.

I suppose the above brands me as a purist, but the misuse of a precise term appears to me to be a degradation of the language. It is somewhat akin to the dilution of meaning of the term Baby Train Master which I first noted in TRAINS as applied to the Fairbanks-Morse 1600 h.p. C-C wheel arrangement road-switcher. Since that time the nickname has been applied to just about all of the non-Train Master FM road-switchers. This is unfortunate, since the original use is considerably more appropriate.

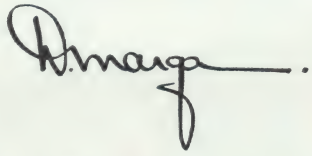
Kenneth L. Douglas.

1315 Singer Pl., Pittsburgh 21, Pa. I

Are you a bird-watcher?

Having no qualifications as an ornithologist, I can't say what bird's egg this oval would describe. Perhaps a robin's. Certainly not a hen's. We reproduce it here because *Kaiser Aluminum News* states that this is the area, approximately ¾ x ⅝ inch, upon which the flanged wheel touches a railroad rail. The load on this tiny oval, says the *News*, can be as much as 32,875 pounds. Which is to say that a 100-car train of 100-ton-capacity cars with a gross weight of 13,150 tons is supported at any given moment by an area totaling just 294.4 square inches — barely more than 2 square feet. Now compare that minimal area of surface drag with the adhesive surface which the same tonnage on tires or in barges would occupy. Imagine: 16 tons riding on less than the area of your thumbnail. What more succinct example of rail efficiency could one ask?

Otherwise: If you have any old annual or trip railroad passes which are worth preservation, please send them to retired telegrapher and dispatcher Jack B. Welles, 502 Elm Ave., Long Beach, Calif. Jack's collection of over 3500 passes issued by 1081 different roads between 1850 and 1963 is eventually tabbed for display at the National Museum of Transport in St. Louis. Jack — and posterity — would appreciate contributions. . . . Is Kansas City Southern the only passenger-hauler that spells out its drinking limits in the *Official Guide*? Says KCS: "Bar service in Missouri and Louisiana." . . . "For shame, for shame," exclaims one of our L&N readers. We reported the road's varied diesel colors as blue-and-yellow and black-and-yellow [page 58, January TRAINS]; we should have said *cream* — not yellow. Also, former NC&StL painted its yard units and Geeps *dark red* and yellow, not brown and yellow. Credit our account with five *brown*ies. . . . In case you haven't heard, the former North Shore *Electroliners* sold to Red Arrow Lines [page 4, February TRAINS] have now entered service between Upper Darby and Norristown, Pa., as the *Liberty Liners*. One train is subtitled the *Independence Hall*, its sister the *Valley Forge*. . . . TV viewers can't complain for lack of railroading recently. Sierra 4-6-0 No. 3 (Rogers 1891) does the honors on *Petticoat Junction*, albeit a bit gaudily attired for our tastes; the *Defenders* rode from New York to Boston the other day on Southern Pacific — a feat which can only be done on a movie or TV screen; and on January 14 NBC's Edwin Newman hosted a special on what's left of the old *Orient Express* between Paris and Istanbul.



P.S. Speaking of TV, did you catch the charity ball staged New Year's Eve in the concourse of Grand Central Terminal? Now we've seen Guy Lombardo serenading dancers milling about the information booth under the famous golden clock and we still can't believe it. I

[Although every possible precaution is taken to insure accuracy, TRAINS assumes no responsibility for errors in listing fan trip schedules which are subject to change without notice. Send copy for the May issue to reach us by March 5; for the June issue by April 5. Please specify whether times are Daylight or Standard. No charge is made for these insertions. Limit two insertions, restricted to the month of the trip and the month preceding it except when circumstances of the trip demand longer notice.]

March 21-29: Rail tour will be conducted to Grand Canyon of Arizona and Mexico's Barranca del Cobre over five railroads, including Chihuahua-Pacific, America's newest rail link through Sierra Madre Occidental. Same Pullman accommodations will be used throughout trip. Fare from San Francisco, $350, including most meals. Minimum deposit of $50 per person (refundable until one week before tour starts) is required. Illustrated folder will be mailed on request to Wampler Tours, Box 45, Berkeley 1, Calif.

March 22: Special train to Monterey, Calif., via Southern Pacific from Oakland and return (with connection from and back to San Francisco) will be sponsored by California-Nevada Railroad Historical Society. Freight-only lines will be used between Oakland and San Jose going via Niles; return will be via Newark. Feature of trip will be use of double-deck commute cars normally used only on San Francisco-San Jose run. Fare, approximately $10.50. For details, write Eldon W. Lucy, president, C-NRHS, 6421 Benvenue Ave., Oakland, Calif.

March 26-29: Tour to Banff, Alta., via Canadian Pacific will be sponsored by West Coast Railfan Association. Trip leaves Vancouver, B.C., 8:10 p.m. in special *Park*-type dome-lounge-observation-sleeping car and stainless-steel Pullman on rear of *Dominion*. Half-day railfan tour by chartered bus from Banff will visit Spiral Tunnels area and Field Hill for photographers. First-class sleeping-car space (including meals), from $35. Twenty-dollar deposit required to reserve accommodation. For details, write Excursion Committee, West Coast Railfan Association, Box 2790, Vancouver 3, B. C., Canada.

March 27-April 12: Rail tour originating in Chicago will be conducted to Mexico's Barranca del Cobre and Grand Canyon of Arizona. Trip over Chihuahua-Pacific, America's newest rail link through Sierra Madre Occidental, will be included. Fare from Chicago (lower berth with most meals included), $595. Illustrated folder will be mailed on request to Wampler Tours, Box 45, Berkeley 1, Calif.

Beginning April 4-5: Tour under sponsorship of Pacific Coast Chapter of Railway & Locomotive Historical Society will be operated to redwood country every week end through June 13-14. Special bus will leave from San Francisco for Fort Bragg, thence group will continue by chartered California Western *Skunk* M-80 to Willits, and on Northwestern Pacific Budd car through Eel River Canyon to Scotia, Calif. Night will be spent in Scotia; return will be made Sunday via NWP to Willits and by bus back to San Francisco. Rates depend upon hotel room, but cost is approximately $31.50 per person (including transportation, box lunch each day, and hotel). For further information, contact Arthur Lloyd, tour director, Pacific Coast Chapter, R&LHS, 974 Pleasant Hill Rd., Redwood City, Calif.

April 5: RDC trip over freight-only branch lines of New Haven Railroad under sponsorship of Connecticut Valley Chapter of National Railway Historical Society will include Watertown, Torrington, and Waterbury-Hartford lines. Excursion leaves New Haven, Conn., 9:45 a.m. Fare, $7; children, $4. For further information, write Edward G. Kelly, trip chairman, Connecticut Valley Chapter, NRHS, 20 Lake Pl., New Haven, Conn. 06511.

April 5: Pacific Railroad Society will sponsor special train on Southern Pacific from Los Angeles to Bakersfield, Calif., and return. Train leaves Los Angeles Union Terminal 8 to 8:30 a.m., returns about 9:30 p.m. Train will stop at Glendale going and returning. Special train will include photographers car, *Daylight*-type reclining-chair cars, dome car, and triple-unit diner. Unusual type motive power and consist may be used. Photo stops will be made en route. For schedule and information, contact Pacific Railroad Society, P. O. Box 5279, Metropolitan Station, Los Angeles 55, Calif.; or call NO 2-8971 evenings 6 to 10 p.m.

April 18: Tennessee Valley Railroad Museum will sponsor diesel-powered air-conditioned excursion to Huntsville, Ala., and Redstone Arsenal. Special tour of Marshall Space Flight Center will be made over arsenal's railroads. Open-door baggage cars for snacks and for photographing will be included in excursion train. Museum's dining car *Valdosta* will probably be part of train. Special leaves Southern Railway's Chattanooga terminal station 8 a.m. [EST], returns about 6 p.m. Entire trip, except arsenal tour, will be via Southern Railway. Fare, $7.50; children under 12, $4.50. For full details, write Trip Chairman, TVRM, P. O. Box 44, Chattanooga, Tenn. 37401.

May 2: Excursion train over freight-only San Jacinto branch of Santa Fe Railway will be operated under sponsorship of Orange Empire Trolley Museum. Portion of line was original main line to San Diego built in 1881 through Box Springs Canyon. Many opportunities for photos from train. Lightweight chair-car train with full lounge car will depart Los Angeles Union Terminal 9:45 a.m., Pasadena 10:15 a.m.; return will be 10:45 p.m. Pasadena, 10:40 Los Angeles. At Hemet, Calif., passengers will attend Ramona Outdoor Play. Fare, $13; $9 for children under 12, including all transportation, reserved seat at pageant, and barbecue dinner following performance. Final date for reservations and payment, April 15. For brochure, write Orange Empire Trolley Museum, P. O. Box 501, Perris, Calif. 92370.

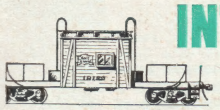
May 9-31: Japanese tour for railfans covering steam and electric operations on Hokkaido, Hunshu, and Kyushu will be sponsored by Roaming Tours. Whenever possible, side trips will be by charter rail car or train. Independent activities for ladies will be planned. Brochures will be sent by request only. For further information contact Roaming Tours, 3380 Granada Ave., San Diego 4, Calif.

May 15-17: Special train under sponsorship of California-Nevada Railroad Historical Society will depart via Western Pacific to Bieber on "Inside Gateway," thence continue on Great Northern to Lookout, on McCloud River Railroad to Mount Shasta, on Southern Pacific to Montague, on Yreka Western to Yreka. Return will be via Yreka Western and Southern Pacific direct. Prairie No. 25 will be used on McCloud River, doubleheaded 2-8-2's 18 and 19 on Yreka Western. Lightweight sleeping cars, chair car, and open-end observation car will be in consist. Fare, approximately $75 (chair car) and $130 (roomette), including meals. For further information, write Eldon W. Lucy, president, C-NRHS, 6421 Benvenue Ave., Oakland, Calif.

July 11-18: New England short-line tour will be sponsored by Euclid Railfans' Club. Chartered bus tour originates at Cleveland, O.; covers East Broad Top, Maryland & Pennsylvania, Strasburg, Philadelphia Suburban (including *Electroliner* fan trip), Branford, Edaville, Steamtown, Monadnock & Northern, Leatherstocking, and Arcade & Attica. For information and rates on all-expense tour, contact George M. Badstuber, president, Euclid Railfans' Club, 21701 Maydale Ave., Euclid, O. 44123.

Before you move, be sure to send your new address to TRAINS so you won't miss a single issue of your subscription. Send both new and old addresses at least one month before date of the first issue to be affected. The post office does not forward magazines, unless arrangements are made in advance and postage is deposited for forwarding.

WHEN WRITING TO ADVERTISERS PLEASE MENTION YOU SAW THEIR AD IN TRAINS MAGAZINE



INTERCHANGE

[This department is for the convenience of readers wishing to acquire or dispose of photographic and other collections relating to railroads. TRAINS reserves the right to edit undesirable copy or refuse listings. **Rate:** 15 cents a word, in advance. Count all numbers and initials, including your name and address (but not including zip code number). Closing date, 15th of second preceding month.]

FOR SALE

First book of its kind! "Car Names and Consists" has 25,000 car names used on passenger and Pullman cars since 1915, with much information on original assignment, re-named cars, etc. $3.50 postpaid, from Robert J. Wayner, Box 871 — Ansonia Station, New York 23, N. Y.

Colorado Steam 1871-1961. "Colorado's Mountain Railroads" Vol. I covers 37 operating lines, Arg. Cent. through Denv. N-W. & Pac. 40 builders' photos, 100 service photos. Individual maps, steam rosters. Corporate, physical, operation data. Construction company notes. 120 6 x 9 pages, paper bound, $3 postpaid. Smoking Stack Press, 1795 S. Sheridan Blvd., Denver, Colo. 80227.

Beautiful locomotive photos available from original Baldwin Locomotive Works negatives (1860-1950). 100-page catalog, $5.00, including six 8 x 10 photos of your choice. Prints 4 x 7 at 25c, 8 x 10 at 50c. H. L. Broadbelt, Hershey, Pa.

One- and two-inch trains and castings; dollar list & photos. Rabon Railroad, Jenks, Okla.

Superb pencil studies of British steam locomotives; details free or $1.00 includes two specimens. Model Railway, 727 Christchurch Road, Bournemouth, Eng.

$10,000.00 in original old Western railroad stock dated 1885. Colorful; suitable for framing, $1.50. Collectors Corner, 1812 Huntsville Rd., Birmingham, Ala.

Steam & Trolley slides. Send for free list and sample slide. Bill Thompson, 14218 S. Indiana Ave., Riverdale, Ill. 60627.

Steam, gas trains: 3½" to 24" gauges. Photos, details $1.00. Trains, 33-T Winthrop, Rehoboth, Mass.

"Hawaiian Railroads," 80 pages, 110 illustrations, hard cover, vivid chronicle of Aloha railroads, $4.95. "Fiddletown & Copperopolis," Carl Fallberg's hilarious 19th Century narrow gauge cartoons in book, popular edition, $3.95. Little railroad classics still available: "Narrow Gauge to Silverton," 1963 edition; "The Slim Princess," SP Narrow Gauge story, $1 each; Generously illustrated, Californians add 4% tax. Hungerford Press Inc., Reseda, Calif.

Pullman spoons, $1.00 each postpaid. Other dishes and tableware also available. Elsie Williams, Box 247, R. D. 2, Elizabeth, Pa.

The diverting story of a Wisconsin northwoods logging railroad is told in "Thunder Lake Narrow Gauge." Cloth bound, 145 rare photos, map, roster. State Historical Society Award of Merit. $7.50 postpaid. Harvey Huston, 860 Mt. Pleasant Rd., Winnetka, Ill.

Slides — Steam & Diesel: Sample and list for 25c and stamped envelope. F. Dennis, Box 66, W. Long Branch, N. J. 07764.

Slides — steam & diesel: Sample and list for 25c and stamped envelope. F. Dennis, Box 66, W. Long Branch, N. J. 07764.

For Sale, active list over 5,000 names of railroaders. High percentage returns. Write Suite 200, 21 East 40th St., New York, N. Y. 10016.

Slides for sale, new lists available: "Yampa Valley Mail," 15c; Rare & Late Steam," 30c; "Alpine Tunnel, Black Canyon," 20c; "Streetcars & Interurbans," 20c. Order from Thirty-five Slides, Green Mtn. Falls, Colorado 80819.

Still available. Hi-Fi 12" LP recording, "Steam Power Along the Chicago & North Western Railway." Features mainline whistles and steam echoes, also a long sequence of a giant Mikado on Ex-2466 in rail-slipping action and unusual power performance. Historic recording was made on mainline between Chicago and Minneapolis where a five-mile ascending grade amid 600-foot-high quartzite bluffs at Devils Lake, Wisconsin, gives whistle signals pronounced resounding echoes. You marvel at the fast Pacifics — once used on the famous Twin Cities "400." Jacket photos also have special appeal. Single copy, $4.98; two for $8.00, postpaid. Dealers' orders welcome. RLP Company, 233 Third St., Baraboo, Wis.

Lake Shore Electric No. 177 in action pen & ink drawing, 12 x 16, ready to frame, $1.25. Bob Lorenz, 1939 Whittaker Dr., Fremont, Ohio 43420.

TRAINS '52 thru '63, $2.25 year; 1941 Loco Cyclopedia $50. Gardiner, 39-20 220th St., Bayside 61, N. Y.

Erie Jersey City Terminal Timetable, early 1950's, $1.00 postpaid. Richard H. Young, 73 Union Ave., Box 13, Clifton, N. J.

Midwest Railroader, P. O. Box 2665D, Ft. Wayne, Indiana, 46808. The Roster Journal. Detailed Steam Locomotive Record several railroads each issue. Six series all different $2.50. Rare material found nowhere else.

Mt. Washington Cog Railway. Kodachrome slides. Artistically and technically superb. Can almost smell the smoke and feel the grease. 10 slides, $2.50; full set of 24, $5.00, prepaid. Iron Horse Products Co., c/o AMA, 600 Winter St., Waltham, Mass. 02154.

Steam fans! All the steam locomotive rosters ever published in Railroad Magazine will soon be available in book form. Information from Bob Wayner, Box 871 — Ansonia Station, New York 23, N. Y.

Great Northern Locomotive Diagrams. Reprint 1952 editions. Roster, specifications, dimensions, drawings. 5½" x 12". Postpaid. Steam, 61 pages, $3.95. Diesel, Gas-Electric & Electric, 81 pages, $4.95. Jim Sheets, Dept. T, 675 Woodlawn, Chula Vista, Calif.

Magazines on railroads, trains, model railroading and model airplanes. Send your want list or ask for our list. Sauder, Dalton, Ohio 44818.

Denver South Park & Pacific map, 11 x 7, fine for framing, 35c. Mailed unfolded in tube 25c extra. Or with two other maps, the famed Georgetown Loop route and unfinished Ohio Creek line, all three in tube, unfolded, $1.00 postpaid.

Steam Locomotive negatives and prints for sale on approval. Collection gathered from many prominent rail photographers. Reasonable prices. Write for information. Railroadiana Journal, Post Office Box 163, St. Charles, Illinois, 60174.

Interurban Electric Employees Timetables. $2.00. Mexican steam or juice negs offered. Fred Fellow, Farmington, Utah.

North Shore Line railroadiana — dining car silverware, timetables, uniform badges, buttons, stationery items and dispatcher's forms. Write RELIC for free list. 380 Shenstone Road, Riverside, Ill.

Baldwin Locomotive magazines: January, April, July, October, 1930, 1934, 1935. Excellent condition. Best offer, single or year. Al Rich, 1116 Wheatsheaf Lane, Abington, Pa. 19001.

Railway History Quarterly next issue April; $3.00 annually. Box 1562-N, Long Beach 1, Calif.

Steam Locomotive, standard gauge 2-8-0, excellent condition, formerly I.C.C. Boulder Scientific Co., Box 150, Boulder, Colo.

Locomotive whistles, headlights, trolley headlights, encylopedia, Loco and Car Builders, Guides, etc., 25c plus stamped envelope for list. C. H. Snyder, 577 Malvern Rd., Akron, Ohio 44303.

For Sale — Standard gauge motor car. Two-man type. Runs good. O. L. Muckey, 1606 W. Second St., Lee's Summit, Mo.

Postal card brings 1964 calendar of "Milestones in Railroad History" commemorative souvenirs. Keepsake Press, Chicago, Ill. 60647.

Speed Limit 20, new Australian narrow gauge book; Skunk, Western Pacific, other books. List free. Transanglo, Box 1562-N, Long Beach 1, Calif.

Complete set Trains, including indexes, first seven years bound. Perfect condition. Sell lot only. Albert Curtis, Cedar Road, Andover, Mass.

Original Negatives: Trunk Roads. Lists 50c each. List SP-21A Southern Pacific, NYC-23A New York Central, MIL-24A CMStP&P, ATSF-25A Santa Fe, CB&Q-26A Chicago Burlington Quincy & Colorado, Southern, CRIP-27A Chicago Rock Island Pacific, WP-28A Western Pacific, BM-29A Boston Maine, BO-30A Baltimore Ohio, NP-31A Northern Pacific, UP-32A Union Pacific, CP-33A Canadian Pacific, CN-34A Canadian National, CNWO-35A Chicago, Northwestern & Omaha Road, CO-36A Chesapeake Ohio, NWV-37A Norfolk Western and Virginian, CNJ-38A Central New Jersey, EDLW-39A Erie and Delaware Lackawanna Western, LN-40A Louisville Nashville, LV-41A Lehigh Valley. Railway Negative Exchange, P. O. Box 92, Oakland, Calif. 94604.

Surplus Negatives sale or trade. List 10c. H. Vollrath, 2524 Meriwether, Shreveport, La. 71108.

Beautiful Raised Printed Stationery is now available from our shop. Samples 10c. Alphabet Printing, Mineola, Missouri 63360.

For Sale: Steam Locomotive 8-ton Henschel, 2-ft. gage, 0-4-0 tank type, excellent condition. 176 psi working pressure, hydro 300 psi. Complete with all fittings. Economical to purchase and operate. Contact Valesh, New Albin, Iowa.

Builder's plate: Exact reproduction from Baldwin Compound (pneumatic) loco. #1474. Solid bronze, 6" x 9" x 3/16", circa 1890. $12.00 postpaid. H. W. Boothroyd, Amherst, N. H.

WANTED

Wanted: 12 lb. rail. State price, condition, amount. G. F. Borders, Sr., Flora, Ill.

Wanted: Good original color slides. Steam, electric locos, gas-electrics, early diesel streamliners. Most roads. Prefer approval basis. Details first letter please. W. Woelfer, 149 S. Eastland Dr., Lancaster, Pa.

Railroads: outdoor, steam, gasoline, 12" gauge and larger. Box C269, Lake City, Minn.

Lanterns, Switchmen's, kerosene burning, indicate railroad initials, general condition and cash price. G. V. Wilson, 707 Taft Rd., Hinsdale, Ill. 60521.

Wanted — Will buy or trade original negatives, any size of CB&Q, FW&D. C&S diesels or older steam power. Especially CB&Q steam 541, 4944, diesels 9365, 9375. Jim C. Seacrest, 2753 S. 27th, Lincoln, Nebr. 68502.

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The Editors

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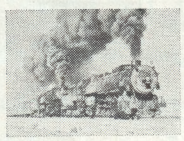

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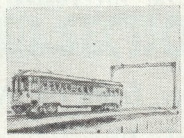

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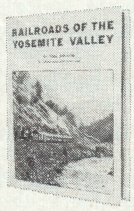

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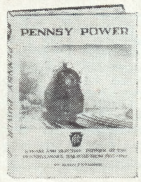

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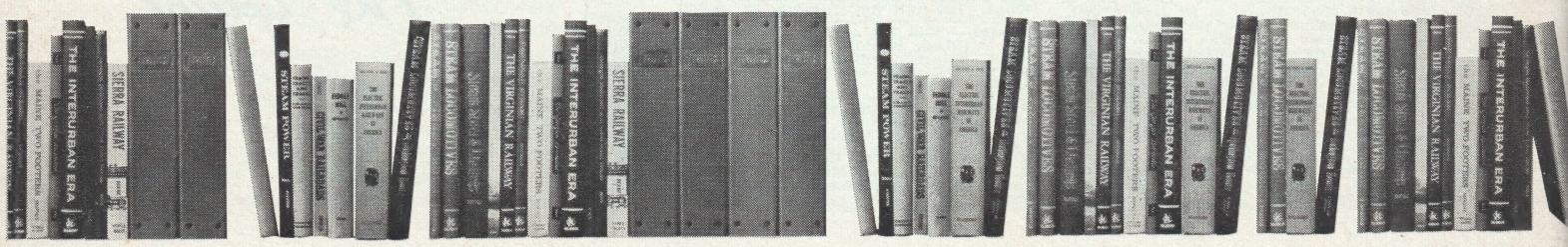

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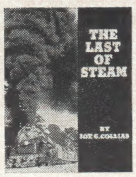

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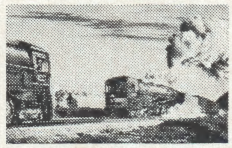

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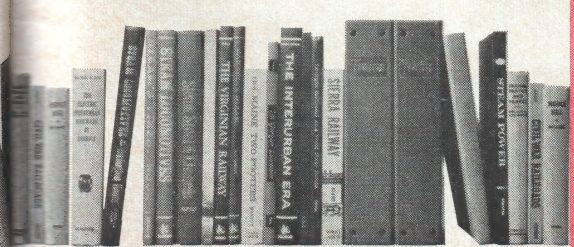

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